DATALOGIC

VLASE IR SYSTEM

USER'S MANUAL

821002850

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SYMBOLS

The symbols used in this manual along with their meaning are shown below. The symbols are repeated within the chapters and/or sections and have the following meaning:

Generic warning:

This symbol indicates the need to read the manual carefully or the necessity of an important maneuver or maintenance operation.

Electricity Warning:

This symbol indicates dangerous voltage associated with the laser, or powerful enough to constitute an electrical risk. This symbol may also appear on the marking system at the risk area.

Laser Warning:

This symbol indicates the danger of exposure to visible or invisible laser radiation. This symbol may also appear on the marking system at the risk area.

Fire warning:

This symbol indicates the danger of a fire when processing flammable materials. Because there is a danger of fire, it is indispensable to follow the instructions provided by the manufacturer when commissioning the marking system.

Note:

First to use laser system must be read marking software user manual.

REVISION INDEX

Revision	Date	Number of added or edited pages
821002850	15-09-2014	Release

NOTE:
We sometimes update the documentation after original publication. Therefore, you should also review the documentation on www.datalogic.com for any updates.

FOREWORD

Information included in the following manual are indicated to a qualified installer able to integrate the laser in a system, accomplishing with all the protection devices required from internationals rules and local legislations.

Following manual is referred to an VL-IR 1PWX-TLS2 system in Class 4 configuration.

In addition to being professionally trained in their role, personnel assigned to work on the marking system must be informed and made acquainted with the risks inherent invisible and visible laser radiation. The operator is required to carefully read the section of the manual concerning safety instructions as well as the sections related to matters falling under his responsibility.

The workers assigned to the marking system can be identified as:

- **OPERATOR**

  responsible for loading elements to be processed, visually checking the work cycle, removing the finished product and cleaning the marking system.

- **MAINTENANCE WORKER**

  responsible for the electrical, mechanical and optical maintenance and adjustment of the marking system.

NOTE:
Datalogic Automation S.r.l**.** shall not be held responsible for any non conforming use of the marking system of its manufacture.

NOTE:
BEFORE INSTALLING AND USING THE LASER, **READ CAREFULLY** THE **APPENDICES.**

OVERVIEW

We are honoured by your choice of a Datalogic Automation product, specifically a new product belonging to the VLase product families, which aim to satisfy new market evolutions, and especially the integration industrial laser sources.

OPERATION OF A LASER SYSTEM WITH GALVANOMETRIC SCANNING

The laser generates a train of high-energy pulses of invisible radiation.
In order to obtain a more accurate focus, the laser beam is first enlarged by using an optical expansion system and then focused, after being deflected by a scanning system consisting of two mirrors mounted on galvanometric motors.
These mirrors deflect the beam in a controlled beam along the X and Y axes; etching of the product surface occurs by coordinating the movement of the two motors with the turning on/off of the laser beam

The deflected laser beam is focused by an F-Theta scan lens before it hits the surface of the product.
Generally speaking, the marking is carried out within the focus of the beam

MARKING SOFTWARE

The marking software Lighter is preinstalled on the system.

NOTE:
Consult Lighter software user's manual for a proper use of the same.

The **VLase** laser marking system features a control unit whose size is compatible with the standard 19" 2,5U in varnished steel, and a resonator whose compact dimensions make it easy to integrate into a system that comprises safety devices required by applicable regulations, the management of marking signals and the customer's complementary modules, if any.

All laser marking system connections are found on the rear of the rack: power supply, safety, electrical signals, communication ports, patch cord to the scanner head, while the front features key and enable command devices, status led in addition to a USB connector for the communication with the internal embedded controller.

VLase belongs to the family of DPSS (Diode Pump Solid State) laser sources in the "end pumped" and "Q-Switched" configuration.
The mechanical and electrical characteristics satisfy standardization and connectivity needs of the industrial field, such as the new 19" rack and different solutions for laser system control.

The new marking system control platform allows for an easy integration in industrial environments and complies with the standard of the other Datalogic Automation marking systems, with the same philosophy implemented in AREX.

Based on the optical layout of the Datalogic VIOLINO laser source, the VLase family guarantees significant improvements in terms of performances thanks to the new laser diode current and temperature controllers, developed by the Datalogic Automation laboratories, which short warm-up time and improve the stability of emitted laser power. The operating temperature range has been extended to 5°- 40°C for its in use in industrial environments.

NOTE:
Laser system installation in secure environment is responsibility of the system integrator!

Figure 1: Control rack and resonator with scan head.

Main features:

- 100 to 240 V AC Power Supply
- Operating Temperature Range extended to 40°C
- Fully integrated marking and system control
- Integrated PC embedded and marking software for stand alone operation
- Ease of integration in industrial environments and maximum control compatibility with other marking platforms (AREX/EOX)
- Integrated photocell and encoder connectors for Marking ON Fly (MOF) applications
- Unattended control of the system by LAN network or serial communication (RS232 protocol)
- Fail-Safe, redundant interlock system, fully compliant with EN 60825-1
- Stable Marking process and high a beam quality (M^2<2)
- Compact Design: 19” 2,5U rack
- High peak power (up to 60kW) and short pulse duration (<10ns)
- Beam Expander with various available magnifications
- Improved focus distance repeatability, thanks to new Beam Expander design which guarantees higher beam collimation control
- Available cable lengths of 3m, 5m, 7m
- Simplified access to Laser Diode Module for fiber installation and Laser Diode Module maintenance
- Dedicated software tool for laser parameter setting and diagnostics

IMPORTANT WARNINGS

Only authorized, qualified, fully-trained personnel and, in any case, only technicians who are fully skilled and aware of the risks inherent in the maintenance of electric, mechanical and optical components, may be allowed to access the internal parts of the electric sections and components of this marking system.
Datalogic Automation S.r.l. declines all responsibility and liability for maintenance and repair work carried out on live parts of this laser system by technicians who have not been authorized or trained to perform such.

The level of training of the persons who intend to work on the marking system must be checked beforehand with the Datalogic Automation.Srl.

NOTE:

It’s not allowed modify destination use of the marking system in different way of its functions.
Datalogic Automation S.r.l. declines any responsibility and liability for irregular and improper use of the laser system witch it manufactures.

NOTE:

These marking system actuation is demanded to the system integrator.

SUMMARY

SYMBOLS III

REVISION INDEX IV

FOREWORD V

OVERVIEW VI
OPERATION OF A LASER SYSTEM WITH GALVANOMETRIC SCANNING vi
MARKING SOFTWARE vi
IMPORTANT WARNINGS vii

SUMMARY VIII

1 : TECHNICAL SPECIFICATIONS AND ACCESSORIES 10
1.1 TECHNICAL CHARACTERISTICS 10
1.2 SEALS 12
1.3 CONTENTS OF THE PACKAGING 13
1.3.1 MAIN HARDWARE 13
1.3.2 CABLES AND OTHER COMPONENTS 13
1.3.3 F-THETA SCAN LENSES 14
1.4 ACCESSORIES 15
1.4.1 RACK HANDLES 15
1.4.2 CABLE KIT 5-7 mt 15

2 : INSTALLATION AND SET UP 16
2.1 DESCRIPTION OF THE MODULES 16
2.1.1 RESONATOR 16
2.1.2 CONTROL RACK 17
2.2 INSTALLATION PRE-REQUISITES 18
2.3 TRANSPORT 18
2.4 FIXING AND POSITIONING 19
2.5 INSTALLATION ENVIRONMENT 21
2.6 FUME / DUST EXTRACTOR 21
2.6.1 FAN INSTALLATION 22
2.7 CONNECTIONS 23
2.7.1 CONNECTING COMMAND BOX CONNECTOR 23
2.7.2 CONNECTING I/O CONNECTOR (CONTROL AXES) 23
2.7.3 CONNECTING INTERLOCK CONNECTOR 24
2.7.4 CONNECTING INTERLOCK OUT CONNECTOR 24
2.7.5 CONNECTING THE OPTICAL FIBER TO THE CONTROL RACK 25
2.7.6 CONNECTING THE OPTICAL FIBER ON THE RESONATOR 28
2.7.7 RADIOFREQUENCY CABLE CONNECTION 30
2.7.8 MDR CABLE CONNECTION 31
2.7.9 RESONATOR CABLE CONNECTION 32
2.7.10 FAN CABLE CONNECTION 33
2.7.11 RS232 CONNECTION 33
2.7.12 POWER SUPPLY CABLE CONNECTION 34
2.7.13 GROUND CONNECTION 34
2.7.14 LOCAL CONTROL MODE CONNECTION 35
2.7.15 REMOTE CONTROL MODE CONNECTION 36

3 : USE AND OPERATION 38
3.1 TURNING ON SEQUENCE 38
3.1.1 ADVICE ON USING THE SYSTEM 41

4 : TECHNICAL SPECIFICATION **68**
4.1 EXTERNAL CONNECTORS SPECIFICATIONS 68
4.1.1 INTERLOCK IN 68
4.1.2 INTERLOCK OUT 69
4.1.3 ENCODER CONNECTOR 70
4.1.4 PHOTOCELL CONNECTOR 70
4.1.5 COMMAND BOX CONNECTOR – PANEL SOCKET 71
4.1.6 AXES CONNECTOR (I/O CONTROL) 73
4.1.7 RS232 CONNECTOR 74
4.1.8 INPUT/OUTPUT SIGNAL SPECIFICATIONS 75
4.1.9 COMMAND BOX LASER SIGNALS 76
4.1.10 CONNECTION EXAMPLES 79
4.2 THERMALIZATION AND SUPPRESSION OF GIANT PULSES 82
4.3 MAINTENANCE 85
4.3.1 F-THETA SCAN LENS CLEAN PROCEDURE 85
4.3.2 CLEAN AIR FILTER PROCEDURE 86

APPENDIX A: LABELS IDENTIFICATION **88**
EXTERNAL LABEL PLACING 90

APPENDIX B: STANDARDS **92**
LASER STANDARDS 92
CE COMPLIANCE 92
FCC COMPLIANCE 92

APPENDIX C: GUIDE FOR SYSTEM INTEGRATOR **93**

APPENDIX D: NOTE ABOUT LASER **94**
LASER SAFETY 94
LASER RADIATION 95
ABSORPTION OF LASER RADIATION 96
CLASSIFICATION AND DANGER LEVEL 96
RADIATION VIEWING CONDITIONS 97
DIRECT VIEWING OF THE LASER BEAM 97
DIRECT VIEWING OF THE BEAM AFTER MIRROR REFLECTION 97
DIRECT VIEWING OF THE BEAM OUTPUT BY AN OPTICAL FIBER 97
DIRECT VIEWING OF THE BEAM AFTER FOCUSING 97
SCATTERED VIEWING OF THE BEAM AFTER FOCUSING 97
DNRO DETERMINATION AND O.D. OF PROTECTION GOGGLES 98
EYES AND SKIN RISKS 100
GENERAL SAFETY REGULATIONS 100
COLLATERAL RISKS 100

APPENDIX E: SOFTWARE UPGRADE **102**

APPENDIX F : MECHANICAL DRAWINGS **106**

APPENDIX G: DECLARATION OF CONFORMITY **116**

FIGURES **118**

1 : TECHNICAL SPECIFICATIONS AND ACCESSORIES

NOTE:
BEFORE INSTALLING AND USING THE LASER, **READ CAREFULLY** THE APPENDIXES.

1.1 TECHNICAL CHARACTERISTICS

CONTROL RACK MECHANICAL CHARACTERISTICS

Weight	15 Kg
Height	122 mm
Width	430 mm
Depth	480 mm
IP Degree	IP20

RESONATOR WITH SCANNER HEAD MECHANICAL CHARACTERISTICS

Weight	7 Kg
Height	166 mm
Width	128 mm
Depth (*)	515 – 581 mm
IP Degree (**)	IP64

(*) Vary from models.

(**) Related to the resonator with scanner head without fan.

NOTE:
Please refer to Appendix for detailed drawings of the different models and configurations!

STORAGE CONDITIONS

Storage temperature	-10° to 60°C (14° to 140°F)
Shock and vibrations	MIL 810E “CAT 1 Basic Transportation”
Package Drop Test	60 cm

NOTE:
Since this product includes precision parts, please avoid vibration & shocks: marking quality may deteriorate.

ENVIRONMENTAL OPERATING CONDITIONS

Model	**10W - 15W - 20W**
Environmental temperature	5°C to 40°C (41° to 104°F)
Humidity	< 90% without condensation
Altitude	< 2000 m
Pollution Degree	2
Overvoltage Category	II

ELECTRICAL POWER SUPPLY

Input Voltage	100 to 240 Vac
Input Current	6 max
Max Power	600W

PERFORMANCES

Model		**10W**	**15W**	**20W**
LASER MARKER SOURCE (specification @ 25°C)				
Laser Type		Class 4 DPSSL (Diode Pumped Solid State Laser)		
Average Power at reference Rep Rate (100kHz) [1]	W	8.5	13.5	17.0
Pulse energy (max)	mJ	0.48 (15ns)	0.65 (12ns)	0.55 (8ns)
Peak power (max)	kW	32	55	65
Central emission wavelength	nm	1064		
Repetition Rate[2]	kHz	10 ÷ 200	15 ÷ 200	20 ÷ 200
Laser aiming beam		Class 2 <1mW @ 630-670nm		
Cooling		Forced Air Rack Fans = L10 @ 40°C : 60000h Resonator Fan = L10 @ 40°C : 70000h		
Noise	dB(A)	< 70 at 1 meter		

OTHER		
Optical Fiber Minimum Bending Radius	mm	200 (fixed installation)
Available Cables Length	m	3, 5, 7
Marking Speed	mm/sec	Up to 4800 mm/sec
Char Marking Speed[3]	char/s	Up to 400 char/s
MOF (Marking on the fly)		YES [constant speed or encoder]
Line speed ¯ Productivity[4]		Up to 75 m/min – 3 Pcs/Sec
Marking Control and Software		EMC Embedded Control and Lighter Suite
Communication		RS232, digital I/O

[1] Without F-Theta
[2] Without Power derating
[3] h char=1mm in roman s Level100% f=100kHz F-Theta160S on TESA label
[4] Single line string, Roman-s font

1.2 SEALS

Several seals have been applied to the marking system, to both the control rack and the resonator.

Figure 2: Example of a seal.

The engraving system has seals in some areas. The seals must not be broken or removed for any reason. The sealed parts may be opened only and exclusively by Datalogic Automation S.r.l. Breakage of these seals by a customer shall result in immediate cancellation of the warranty on the entire engraving system.

NOTE:

If a customer **breaks or removes the seals placed** by the manufacturer on the marking system **the warranty** on the entire system will immediately become **null and void**.

WARNING!

The manufacturer shall not be held liable for any **non conforming use** of the marking system of its manufacture.

It is **forbidden** to operate the marking system before the machine it is intended for has been **declared in conformance** with statutory Directives.

NOTE:

Access to the internal parts of the marking system is only permitted for **authorized personnel**, who have been trained and instructed on the electrical risks.

Datalogic Automation S.r.l. shall not be held liable for work on electrically charged parts by inadequately trained personnel!

NOTE:

Access to the internal parts of the resonator is only permitted for **authorized personnel**, who have been trained and instructed on the optical risks!

Datalogic Automation S.r.l. shall not be held liable for work on parts by inadequately trained personnel!

1.3 CONTENTS OF THE PACKAGING

1.3.1 MAIN HARDWARE

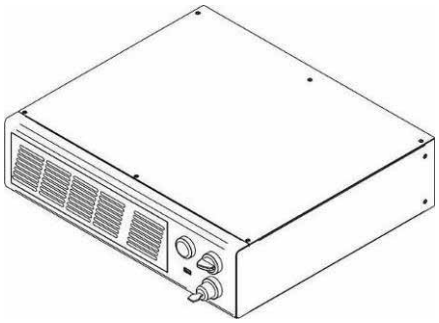


Figure 3: Control rack.

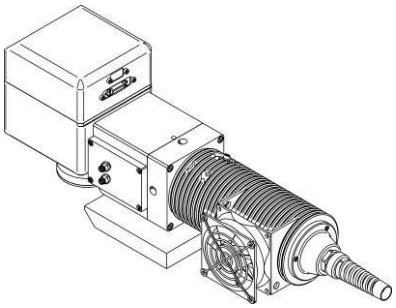


Figure 4: Resonator with F-Theta scan lens

1.3.2 CABLES AND OTHER COMPONENTS

Figure 5: RF cable

Figure 6: Resonator cable

Figure 7: Optical fiber cable

Figure 8: Power supply cable

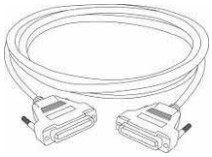


Figure 9: Scan Head cable

Figure 10: Command Box cable

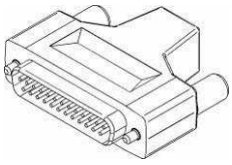


Figure 11: Signal key

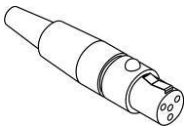


Figure 12: Interlock connector

Fig. 13: Interlock OUT connector

Figure 14: Safety Key

Figure 15: USB Stick

Figure 16: Cable gland

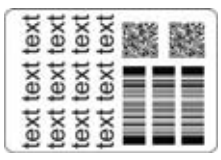


Figure 17: Sample Test

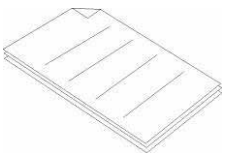


Figure 18: User Manual

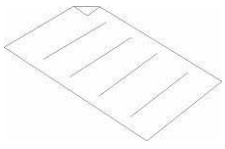


Figure 19: Test Report

1.3.3 F-THETA SCAN LENSES

DLA provides a wide range of F-Theta scan lenses to be applied to the scanning head to focus the laser beam in flat Marking Field, in order to achieve high-resolution marking results.

These F-Theta scan lenses are available to best-match the object (i.e.: logo; string; 2Dmatrix; etc.) to be marked with customer need, over the material processing, and fit the standard DLA Scanning Head; further solutions about different models of F-Theta scan lenses and scanning heads will be considered upon request.

Below the chart of the standard F-Theta scan lenses currently available:

F-Theta Scan lens		***f* = 160S**	***f* = 254S**
Lens Diameter		**M39 x 1**	**M39 x 1**
Maximum External F-Theta scan lens Diameter	mm	47	65
Working Distance (WD)	mm	184*	294*
Fixing Distance (FD)	mm	153,1**	286,4**
Marking Area (MA)	mm^2	100 x 100	140 x 140

* Tolerance: ± 1 mm

** Tolerance: ± 1,5 mm

NOTE:
Other F-Theta scan lenses available on request!

Working Distance (WD) is defined as the distance between the center of the working area (defined in the focal plane) and the last mechanical edge of the F Theta. Refer to the following figure:

WD: Working Distance

MA: Marking Area

AB: Aiming beam

FD: Fixing Distance

WA: Working Area

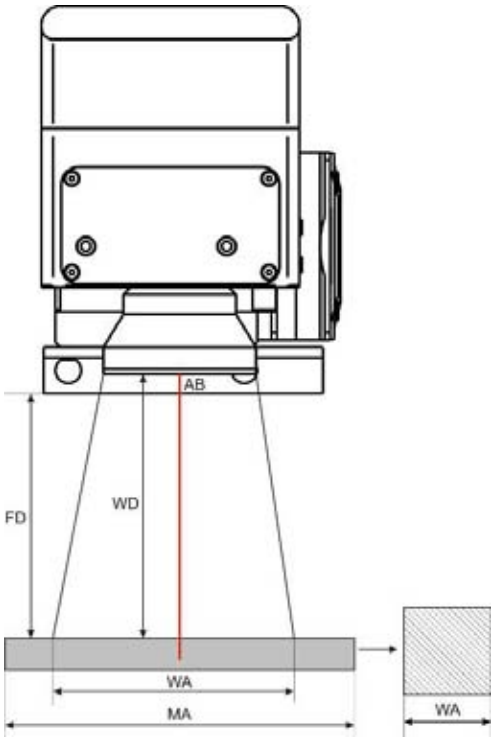


Figura 20: Working distance

NOTE:
Working Distance (and Fixing distance) here reported is guaranteed only for the first equipment F-Theta scan lenses. In any case these are reference values that have to be verified from the laser integrator.

1.4 ACCESSORIES

The accessories listed here below are described for information purposes only, and are not necessarily included in the packaging. The minimum contents of the packaging include the main hardware, cables and keys. For additional information, please refer to paragraph 1.3.

1.4.1 RACK HANDLES

Handles for rack fastening are available on request.

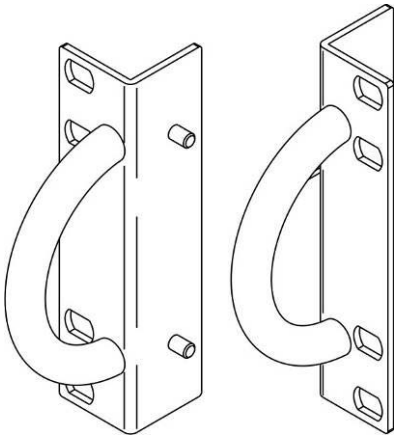


Figure 21: handles rack.

1.4.2 CABLE KIT 5-7 mt

Kits are available on request cable lengths of 5 meters and 7 meters.

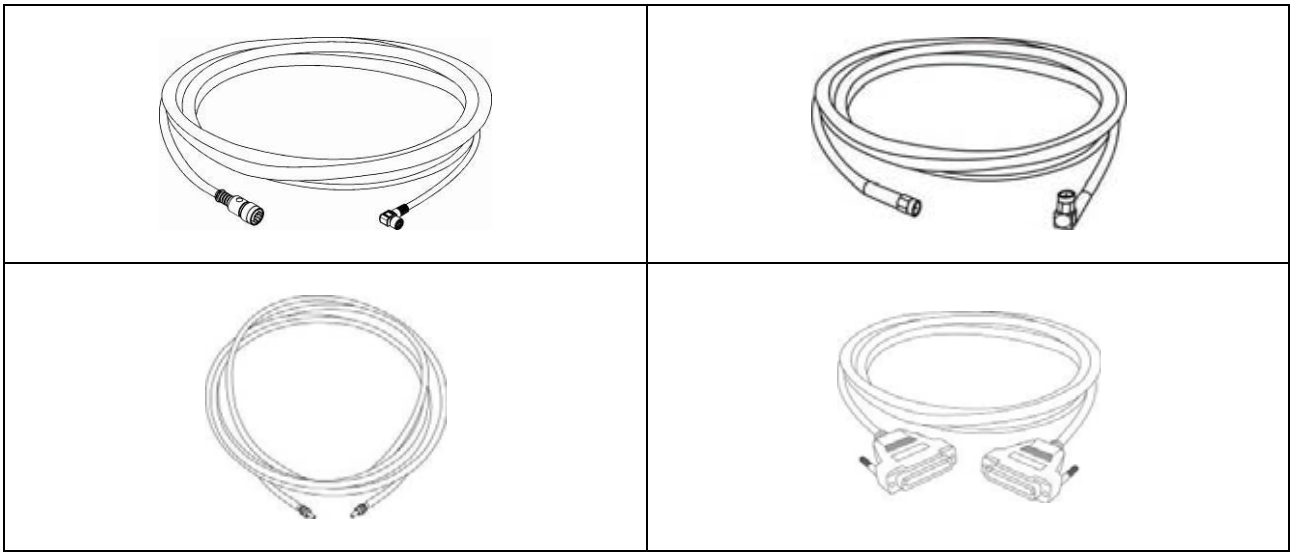


Figure 22: Cable Kit lenght plus.

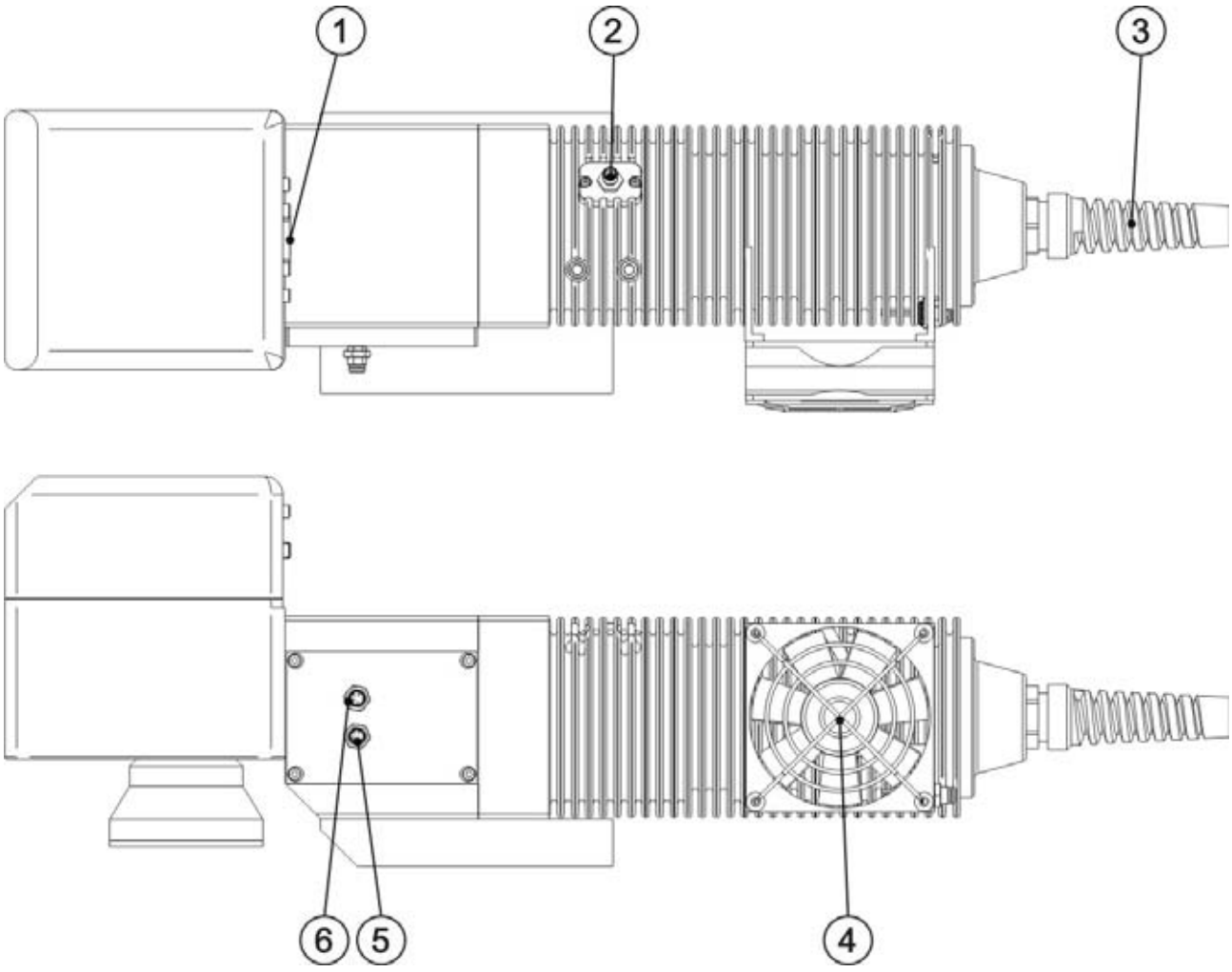
2 : INSTALLATION AND SET UP

NOTE:
VLase is a **Class 4** laser marking system.
For proper use under conditions of safety they must be brought to **Class 1**.

2.1 DESCRIPTION OF THE MODULES

2.1.1 RESONATOR

A description of the main parts of the resonator unit is provided here below:

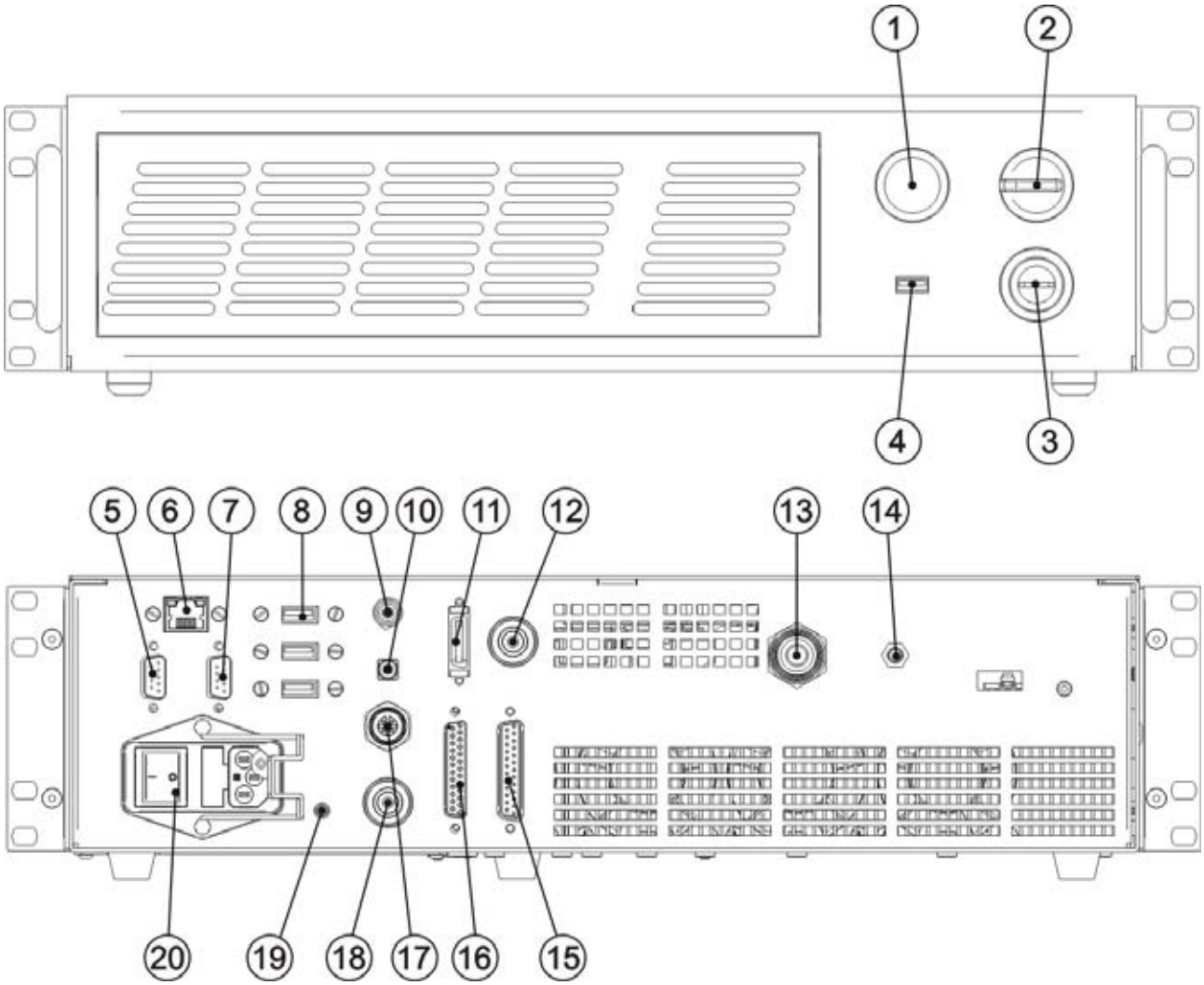


1) Scan Head signals connector	4) Cooling fan
2) RF connector	5) Fan connector
3) Optic fiber inlet	6) Rack-Resonator connector

Figure 23: Resonator view.

2.1.2 CONTROL RACK

A description of the control rack is provided here below for the purpose of obtaining the right information for proper installation of the marking system.



1) Status led	11) MDR connector
2) Enable	12) Resonator signals connector
3) Key	13) Optic fiber outlet
4) USB port	14) RF connector
5) VGA port	15) Command Box connector
6) LAN port	16) I/O connector (axis control)
7) RS232 port	17) Photocell connector
8) 3x USB ports	18) Encoder connector
9) Interlock connector	19) Earth ground
10) Interlock OUT connector	20) Main power supply connection

Figure 24: Control rack front view.

2.2 INSTALLATION PRE-REQUISITES

Once it is installed in a suitable environment, the VLase marking system is already set for use since it is equipped with Embedded PC with marking software preloaded.

If the system is not used in remote mode, a monitor and input peripheral devices (not included) are needed nevertheless.

2.3 TRANSPORT

The marking system can be easily lifted up and moved by a single person thanks to its compact size and reduced weight.

WARNING!

To avoid damaging or breaking the optical fiber, never subject it a bending radius below the limits specified in the technical specification table.

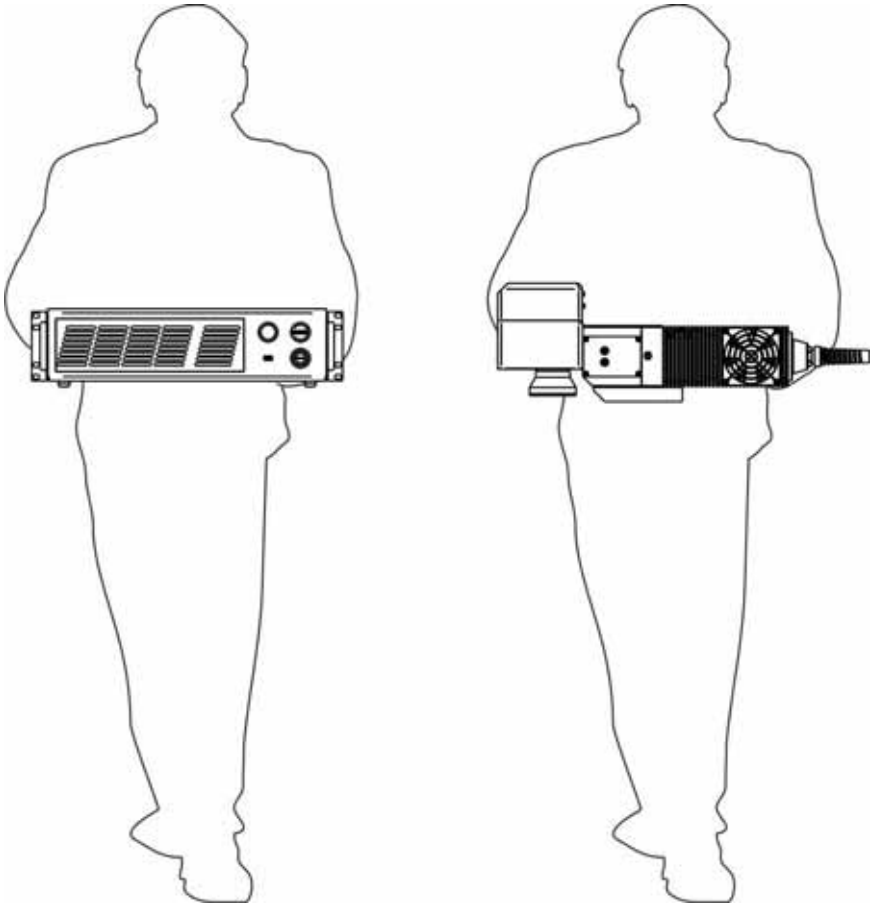


Figure 25: Transport.

NOTE:

VLase is a delicate opto-electronic laser marking system, avoid damaging it with shock and vibrations.

NOTE:

Be extremely careful to not damage the fiber octic cable between resonator and rack.

2.4 FIXING AND POSITIONING

The marking system must be positioned in a safety manner and must be followed the precautions listed below.

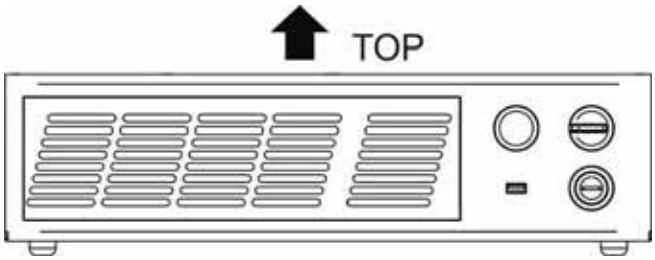


Figure 26: Positioning rack.

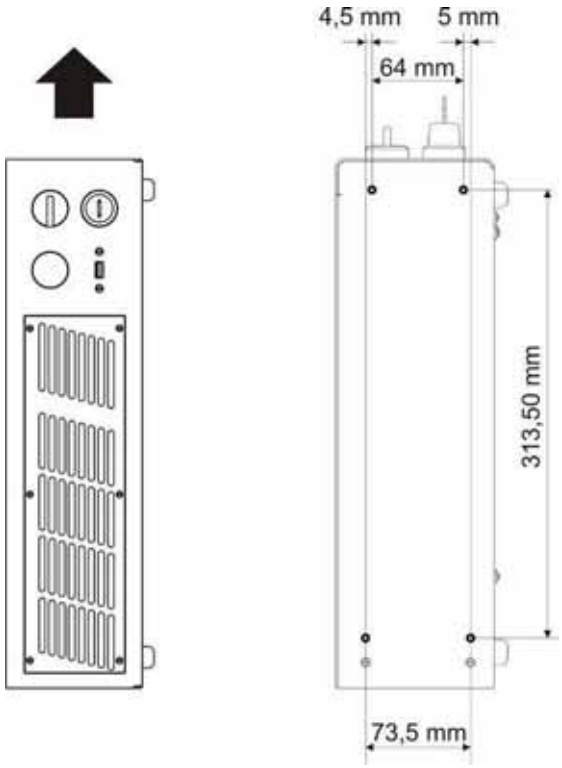


Figure 27: Vertical positioning (need additional fixing).

Don't fix the marking system in manner not shown in figure.

The marking system can be fitted inside a special rack cabinet equipped with special support shoulders and handles, available on request. Here are the odds of the mounting points for mounting in rack (rack handles available as accessory):

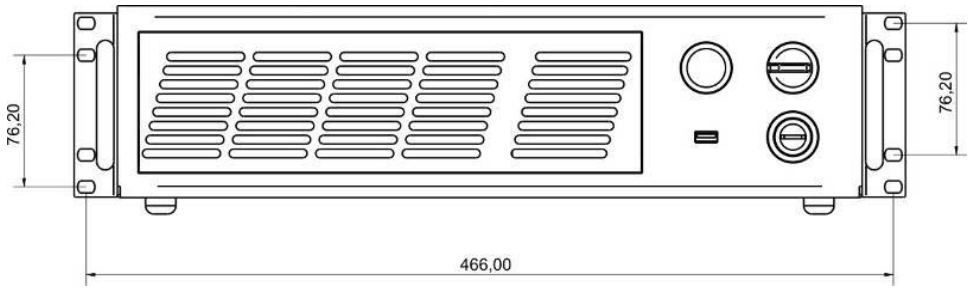


Figure 28: Fixing points on rack handels (cabinet assembly).

The resonator must be secured to a special base (not supplied by Datalogic Automation S.r.l.) using the four M6 threaded holes.

The resonator, just like the control rack, must be safety positioned and secured on a special surface, parallel to the ground and absolutely vibration-free. The resonator can be secured both horizontally and vertically.

NOTE:
In order to prevent marking distortions, install a vibrometer on the base of the piece to be marked and check for the absence of vibrations during the marking process.

NOTE:
It is recommended to install the resonator on a micrometer positioning Z-axis system!

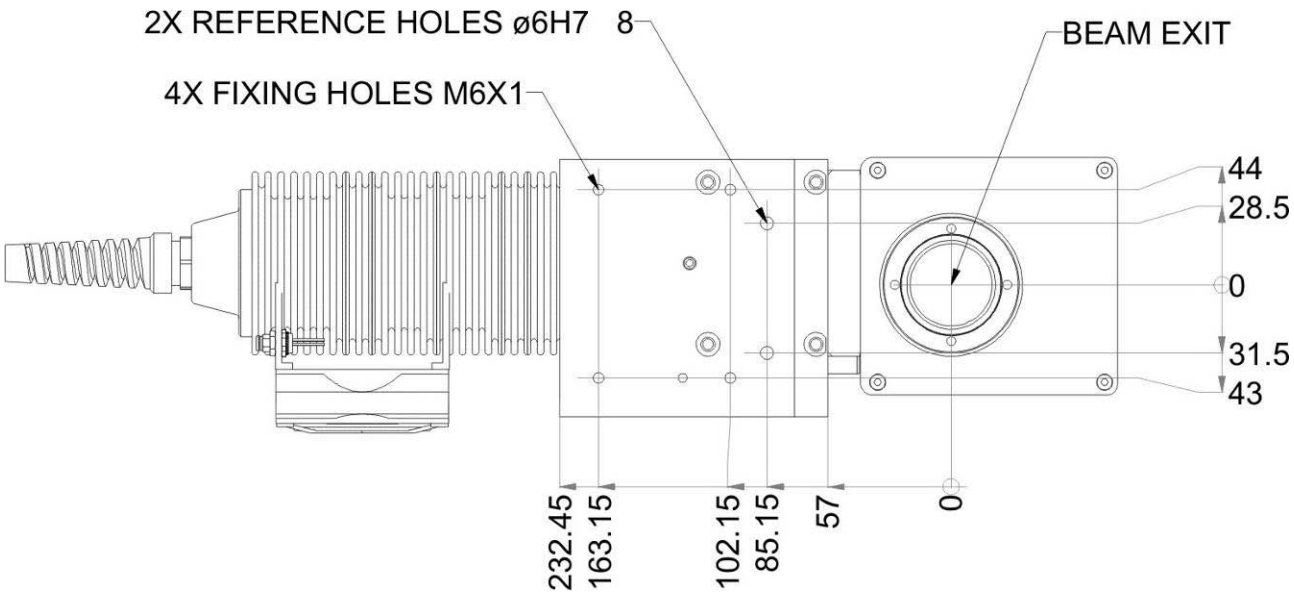


Figure 29: Resonator fixing points

It is very important to secure the laser system before you start marking the piece since improper securing or positioning may cause serious damage.
Do not secure the marking system in a way other than the one described in the figure.

NOTE:
Please refer to Appendix for detailed drawings of the different models and configurations!

2.5 INSTALLATION ENVIRONMENT

The control rack must be installed in a suitable environment in order to allow proper air flow passage and correct housing of the cables.
VLase is an air cooled marking system, an adequate air flow is necessary to guarantee correct cooling of the system. Please install in order to not stop the flow of air cooling. Moreover, please do not install an heat source near.
Clean air filter when it is dirty. If the air filter is dirty, the air-flow might become not sufficient to ensure correct cooling and might stop marking operation. Exchange air filter periodically.

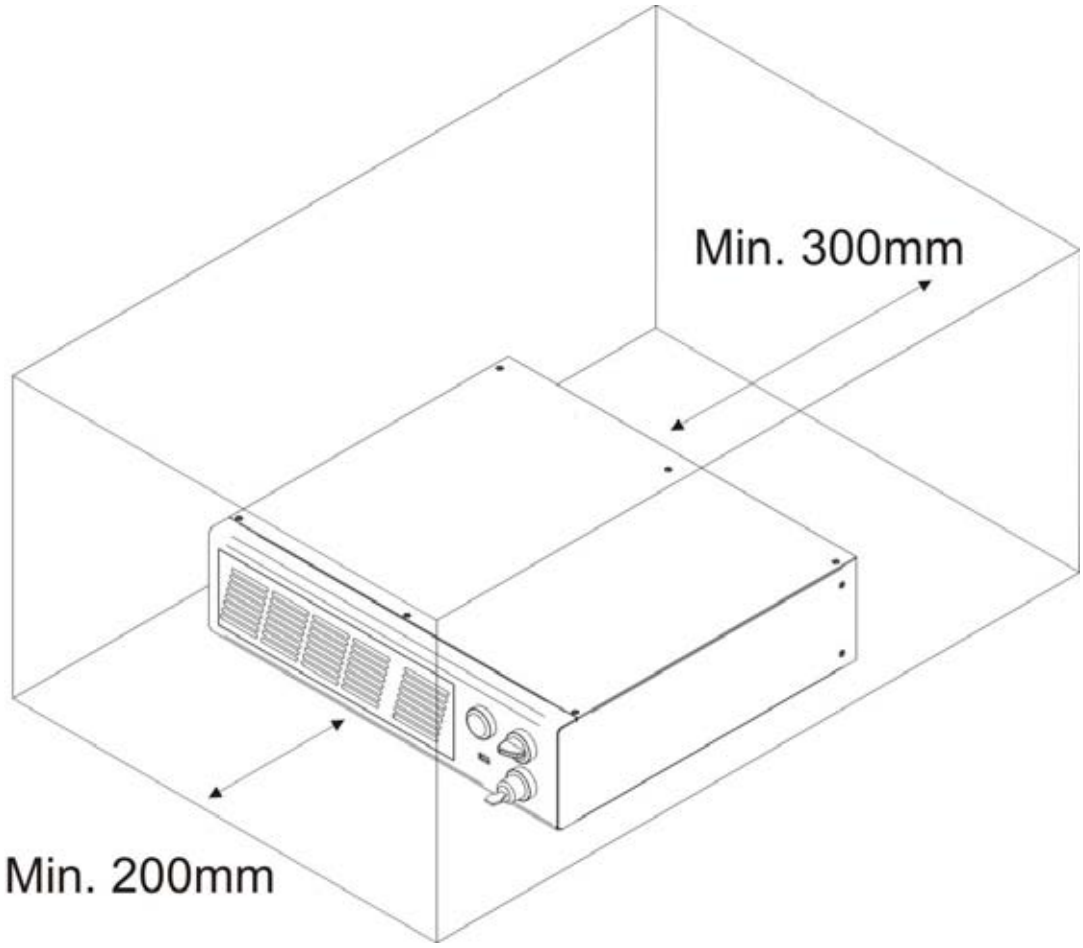


Figure 30: Rack installation environment.

NOTE:
DO NOT place heavy objects on top of rack!

2.6 FUME / DUST EXTRACTOR

During marking process, dust and/or gas may be produced. It is important to use adequate fume extractor and/or air filtration.

NOTE:
Marking PVC (or other plastic material) can cause the release of chlorine gas witch can be **harmful** to the laser operator and to the marking system itself. Always use adequate fume extractor during PVC and plastic marking.

2.6.1 FAN INSTALLATION

The fan supplied with the device must be accurately positioned and fixed on the resonator so that it can work properly.

The fan must be assembled so that the air flow is aimed at the unit containing the crystal (gold-coloured section on the resonator).

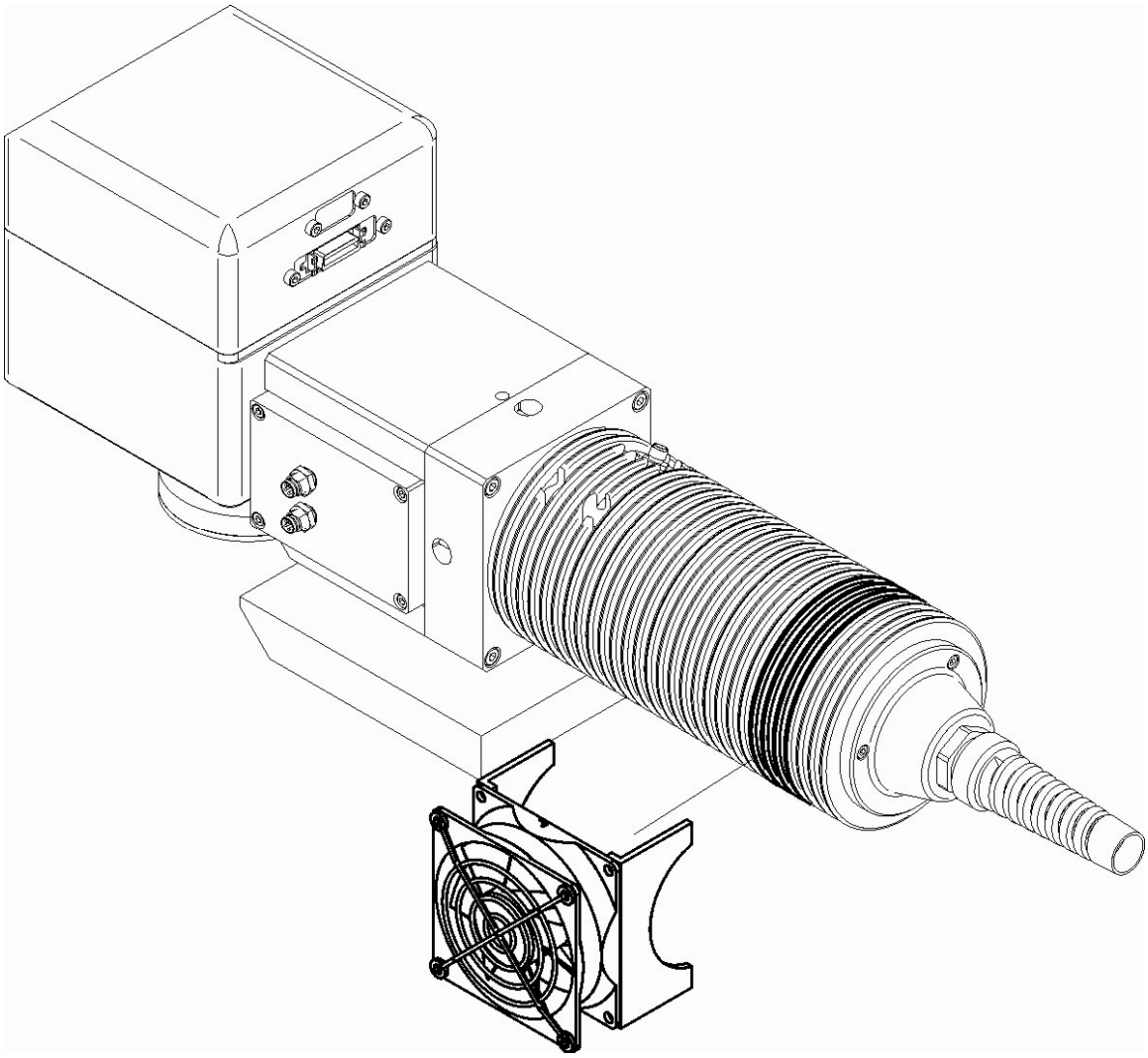


Figure 31: Fan installation.

2.7 CONNECTIONS

This section of the manual describes the marking system wiring. Carry out the connecting operations as described below.

CAUTION:

Connect the devices one to the other **WITHOUT** voltage in order to avoid risks for the operator and for the marking system.

2.7.1 CONNECTING COMMAND BOX CONNECTOR

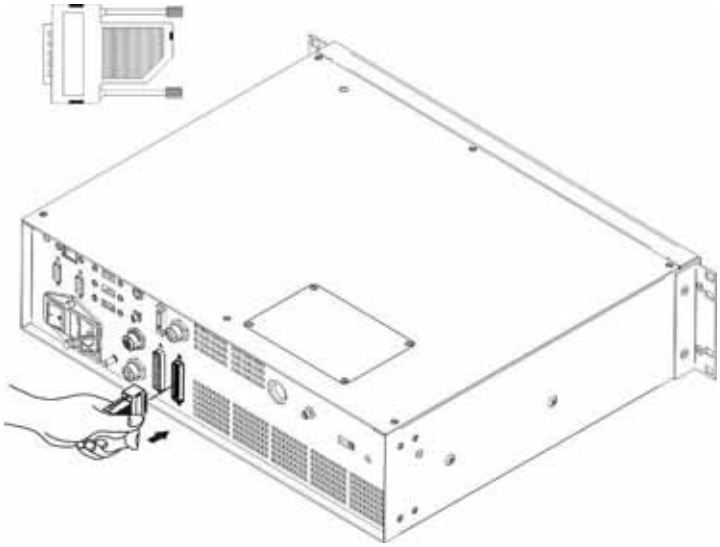


Figure 32: Connecting Command Box connector.

NOTE:

The Command Box connector must always be inserted in order to use Enable and Key on the front panel of the rack.

2.7.2 CONNECTING I/O CONNECTOR (CONTROL AXES)

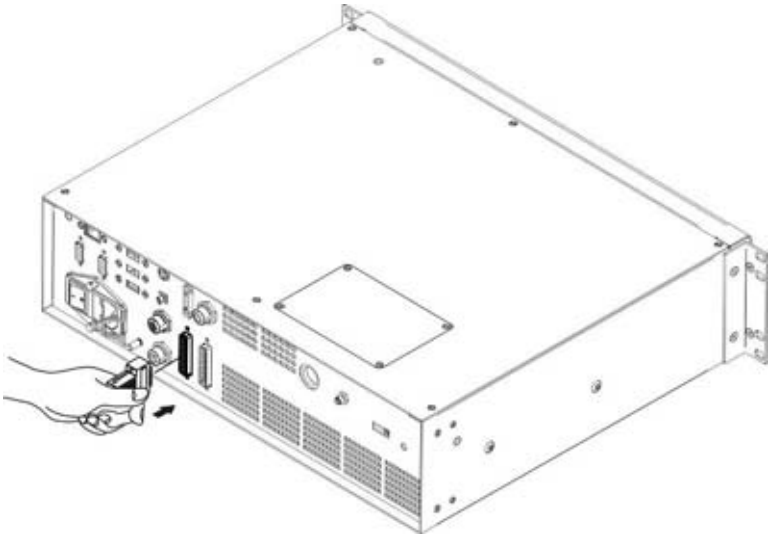


Figure 33: Connecting I/O connector.

2.7.3 CONNECTING INTERLOCK CONNECTOR

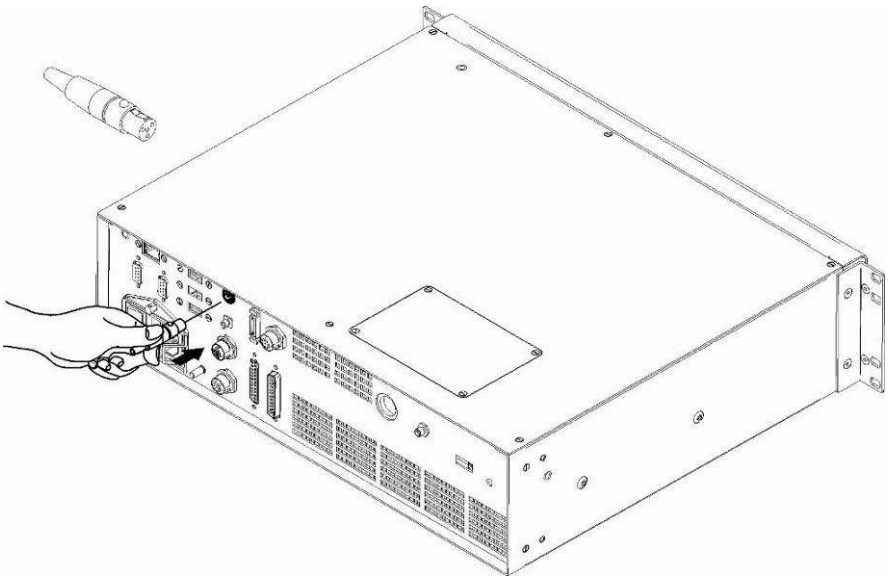


Figure 34: Connecting interlock connector.

NOTE:
The interlock connector must always be inserted in order to use the marking system. The absence of such connector locks the system.

NOTE:
The **interlock connector** implements the **double and redundancy safety interlock** (EN60825 compliant).

2.7.4 CONNECTING INTERLOCK OUT CONNECTOR

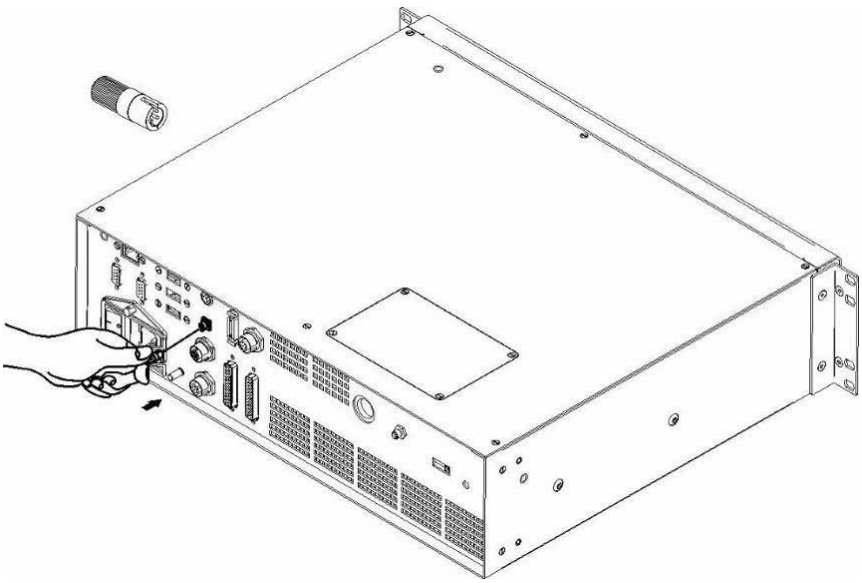


Figure 35: Connecting interlock OUT connector.

2.7.5 CONNECTING THE OPTICAL FIBER TO THE CONTROL RACK

Follow the steps listed here below to connect the optical fiber to the control rack:

1) unscrew the four screws holding the cover plate on the rack.

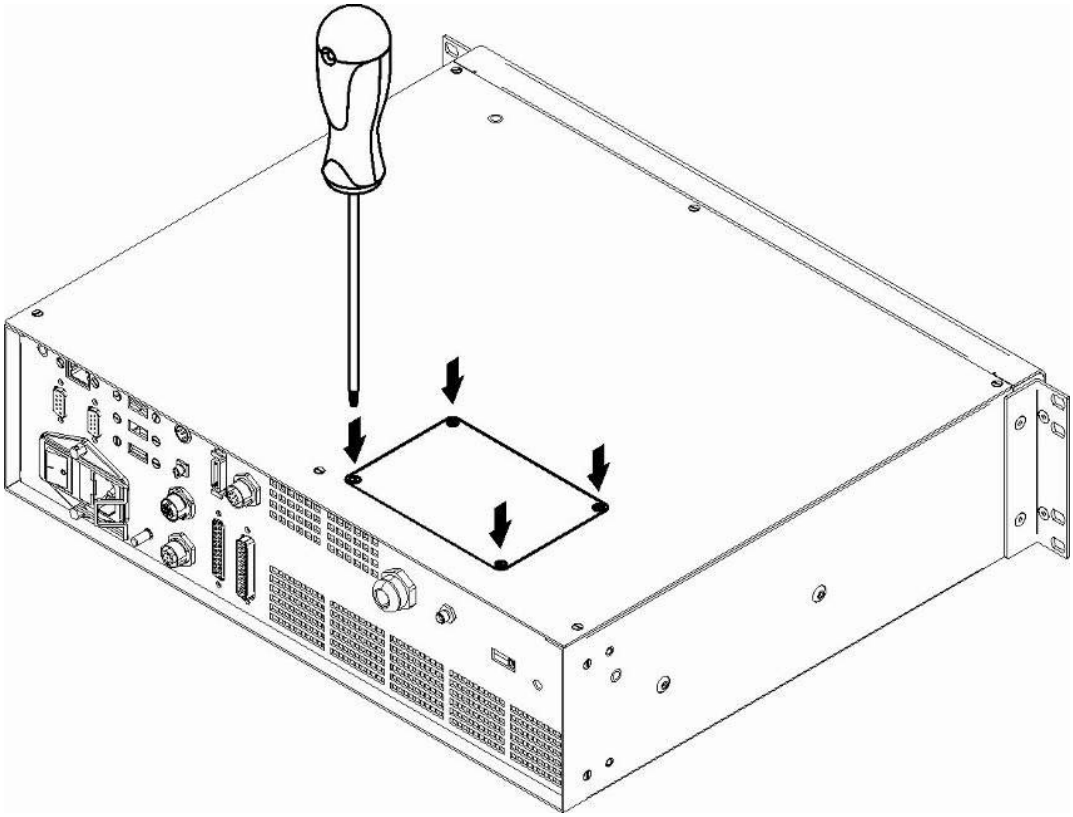


Figure 36: Removing the cover plate from the rack.

2) insert the optical fiber into the cable gland without removing its protection cap.

NOTE:
The insertion of the optical fiber is a delicate operation. You must make sure that the optical fiber is protected by his cap during insertion in the antenna cable to avoid damage or dirty it.

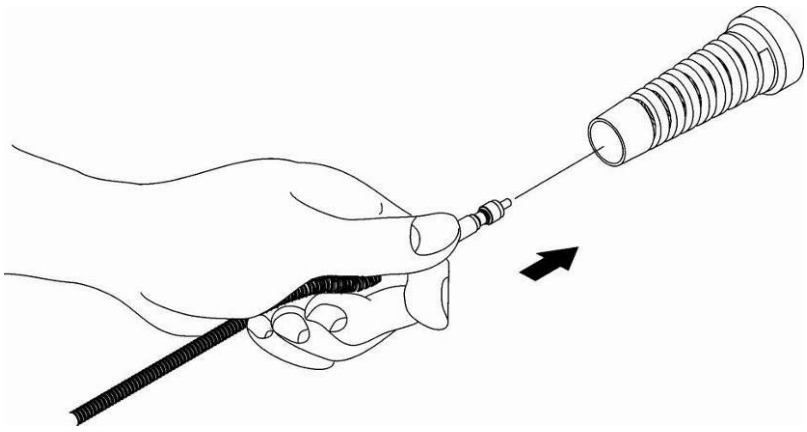


Figure 37: Passing the optical fiber through the cable gland.

3) insert the optical fiber into the PG cable gland mounted on the rear panel of the rack.

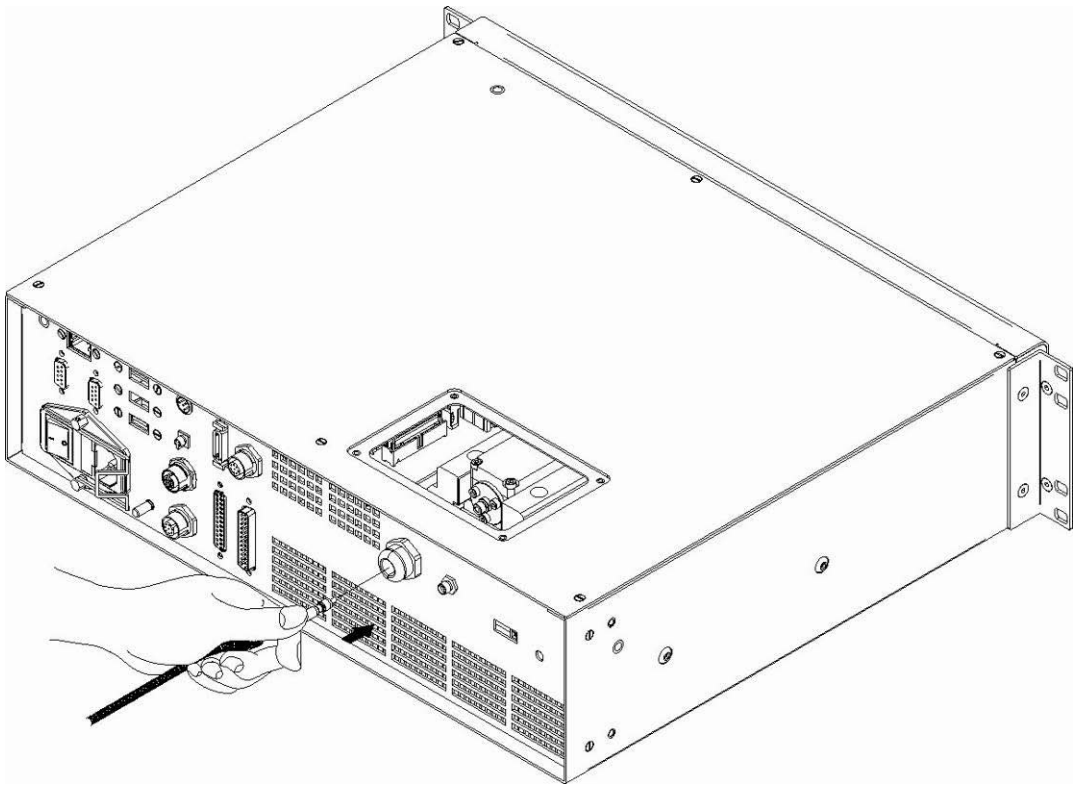


Figure 38: Passing the optical fiber through the PG cable gland.

4) remove the drain plug and tighten to form the fiber diode paying attention not to soil or scratch the fiber end.

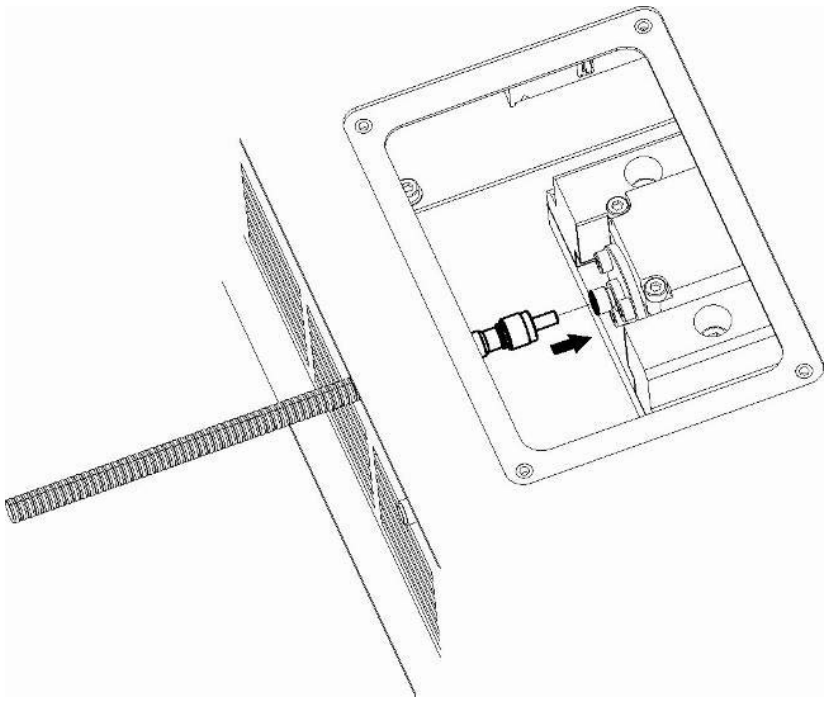


Figure 39: Connection of the optical fiber.

5) fixing the cable gland on the PG.

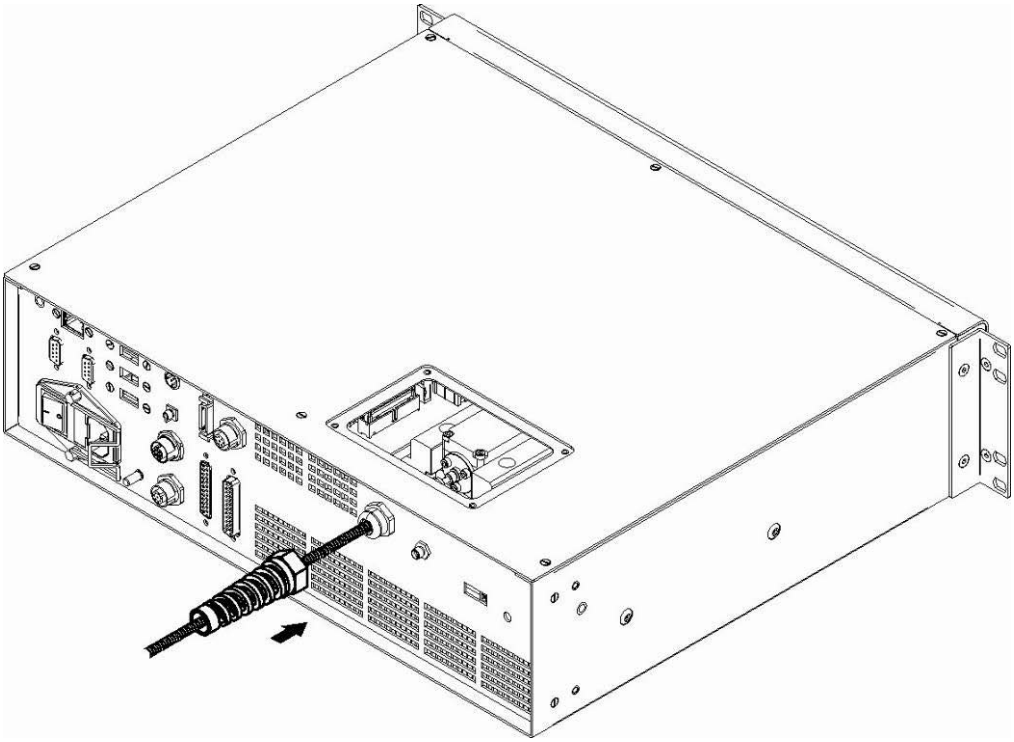


Figure 40: Fixing the cable gland.

6) closing rack top cover.

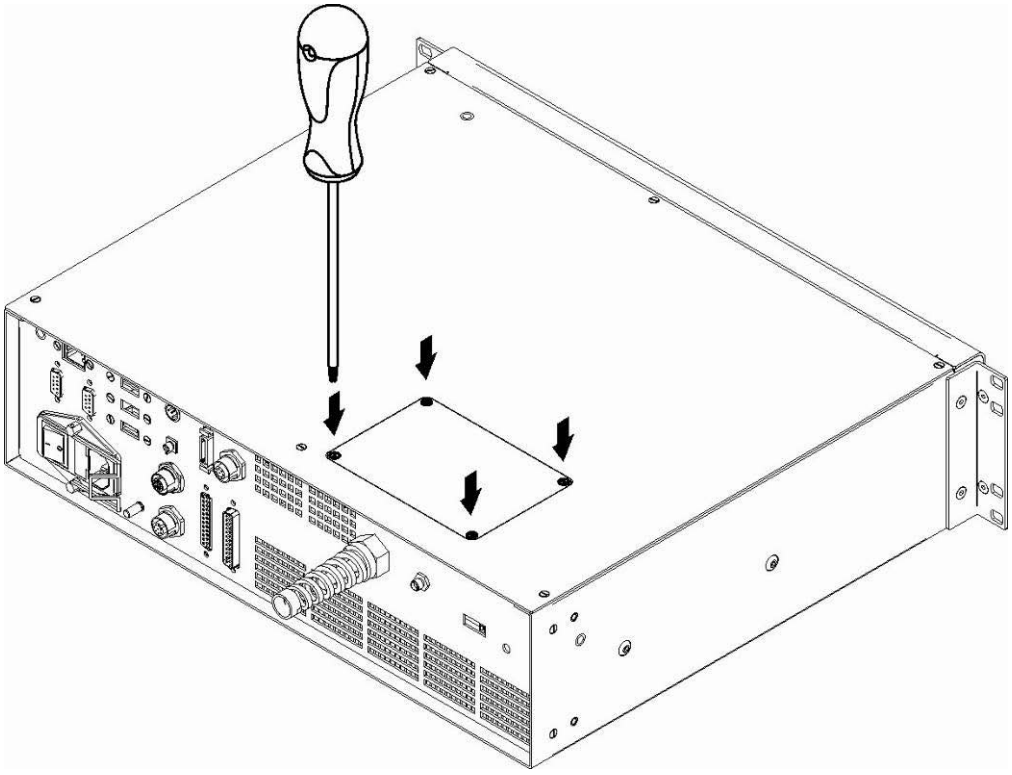


Figure 41: Closing cover.

2.7.6 CONNECTING THE OPTICAL FIBER ON THE RESONATOR

Follow the steps listed here below to wire the optical fiber to the resonator:

1) unscrew the three screws that secure the metallic cover and cable gland to the resonator.

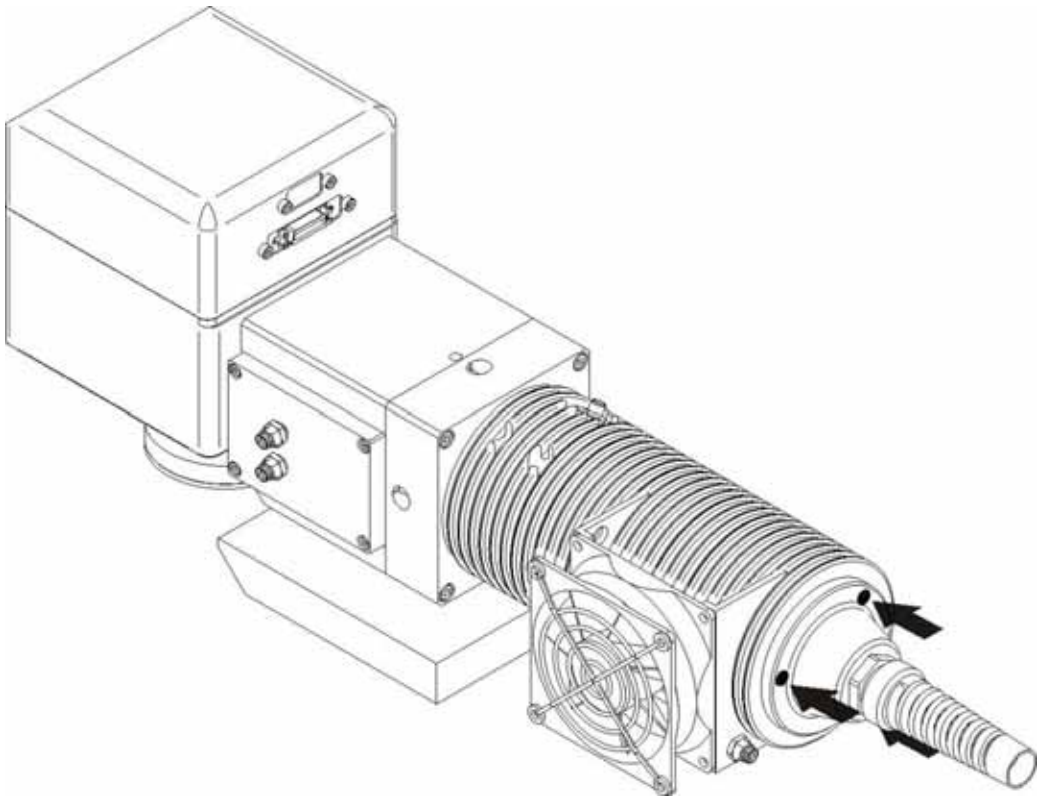


Figure 42: Disassembling the optical fiber cable gland from the resonator.

2) insert the optical fiber in the cable gland without removing the **protection cap.**

NOTE:
The insertion of the optical fiber is a delicate operation. You must make sure that the optical fiber is protected by his cap during insertion in the antenna cable to avoid damage or dirty it.

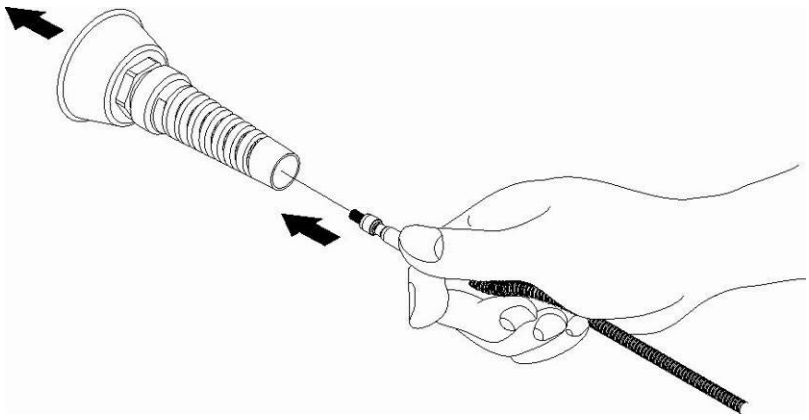


Figure 43: Passing the optical fiber through the cable gland.

3) remove the protection cap and insert the optical fiber in the resonator, being careful not to damage the end of the fiber or getting it dirty.

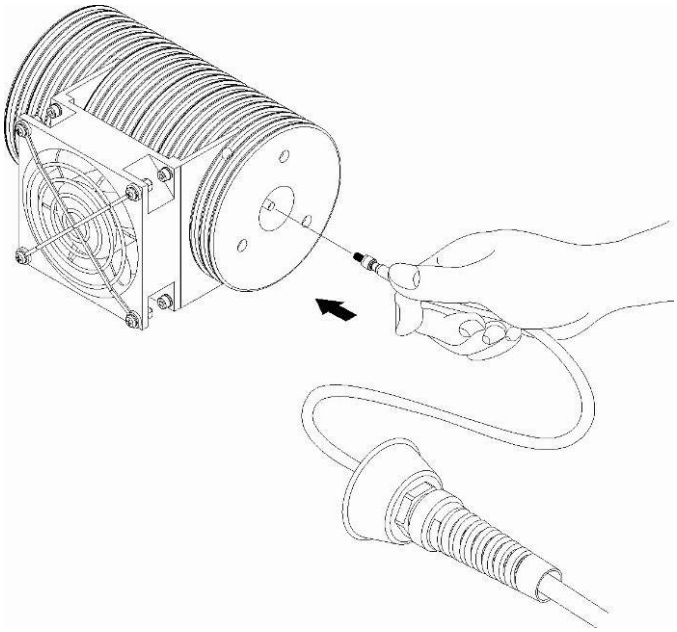


Figure 44: Connecting the optical fiber to resonator.

4) screw the protection cap back on the resonator.

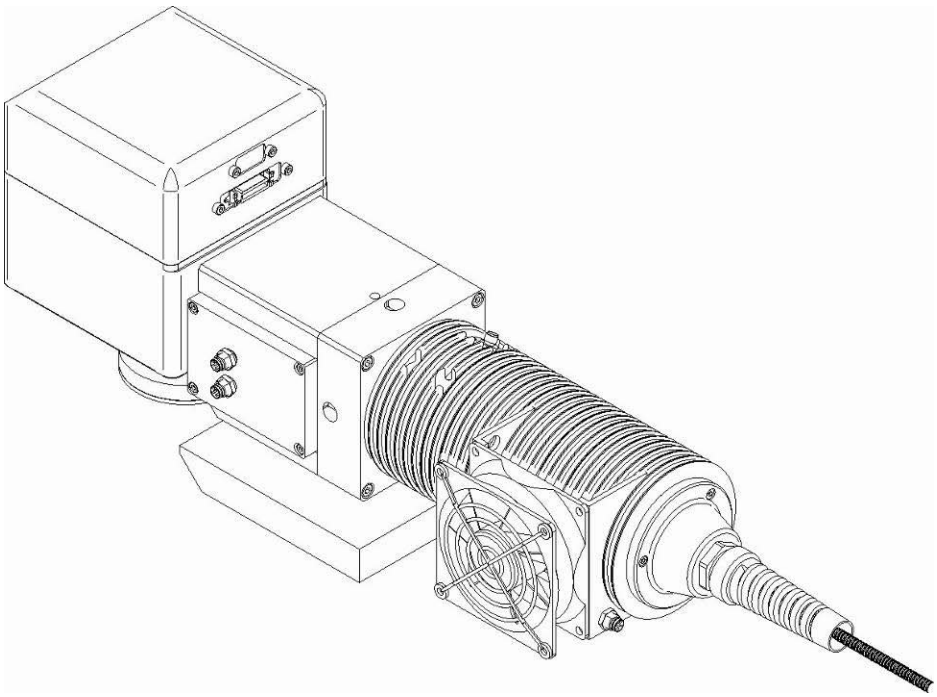


Figure 45: Final closing.

WARNING!

To avoid damaging or breaking the optical fiber, never subject it to rays with a curve under **20 cm**.

2.7.7 RADIOFREQUENCY CABLE CONNECTION

Screw in SMA connectors, starting at resonator side (90° end) then at the rack side.

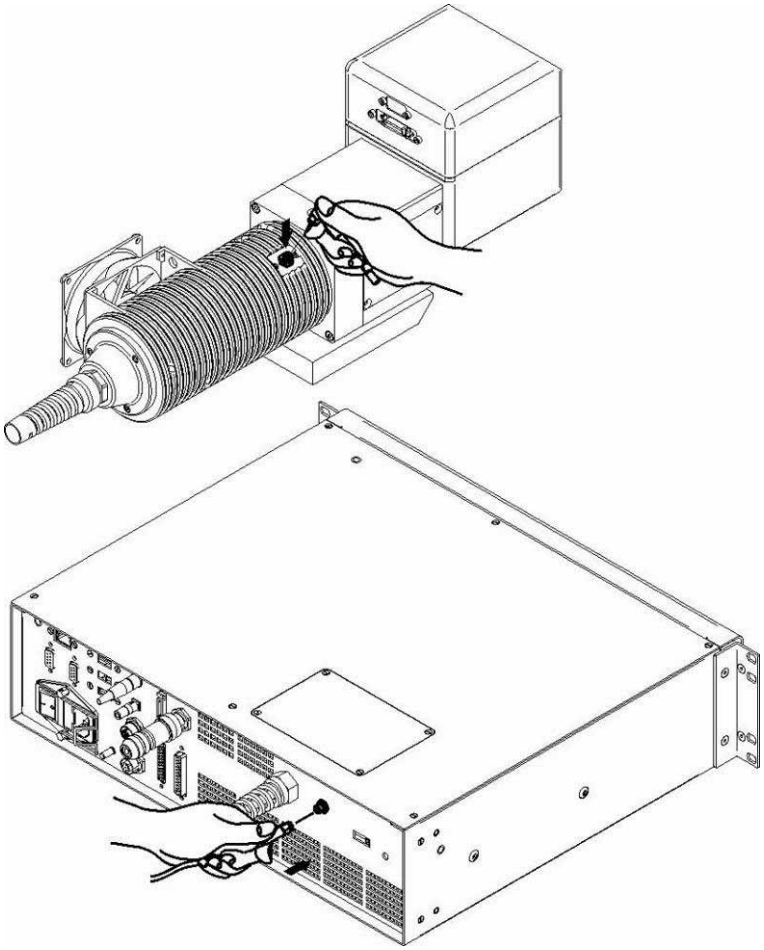


Figure 46: RF cable connection.

After inserting the cable, tighten the connectors using an 8-mm wrench as shown below.

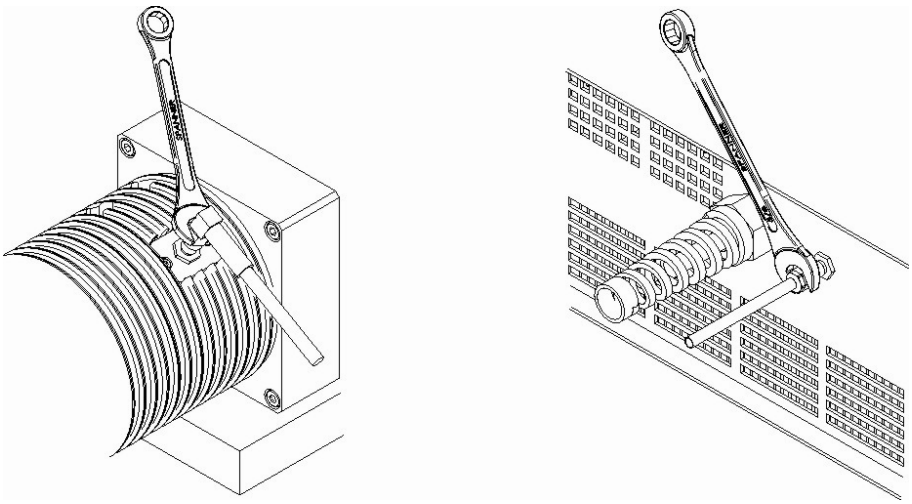


Figure 47: Tightening the RF cable.

2.7.8 MDR CABLE CONNECTION

Connecting MDR cable to rack:

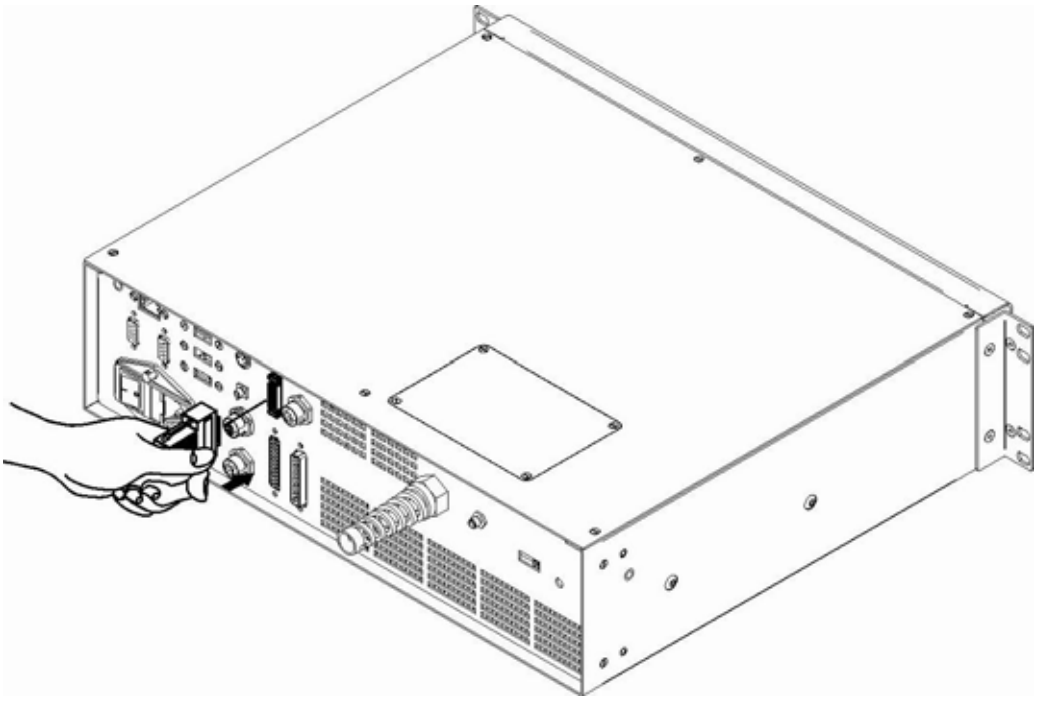


Figure 48: MDR connection side rack.

Connect the other end of the cable to the scanner head.

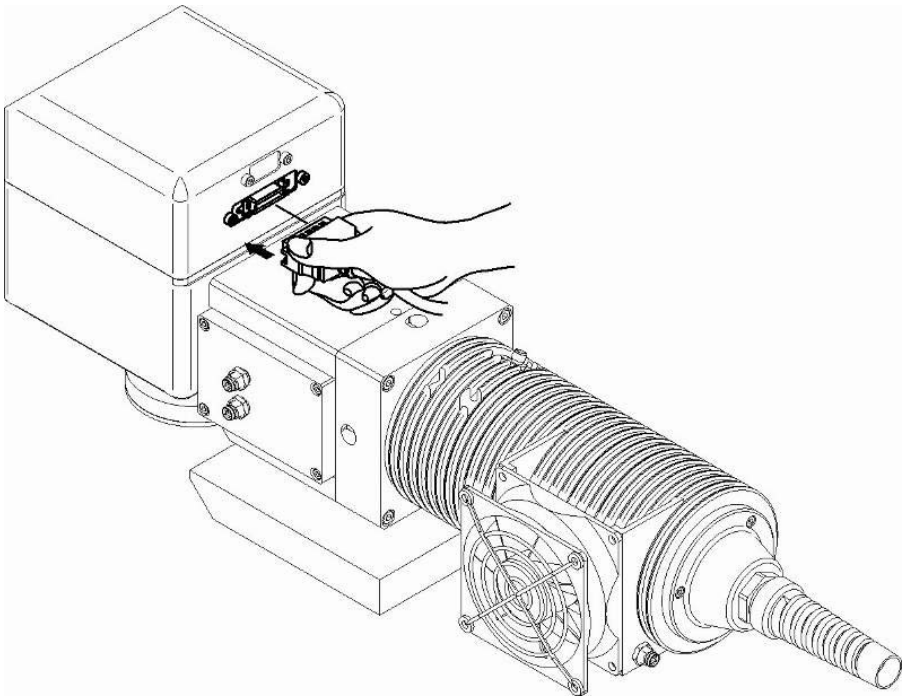


Figure 49: MDR connection side resonator.

2.7.9 RESONATOR CABLE CONNECTION

Connecting resonator cable to rack:

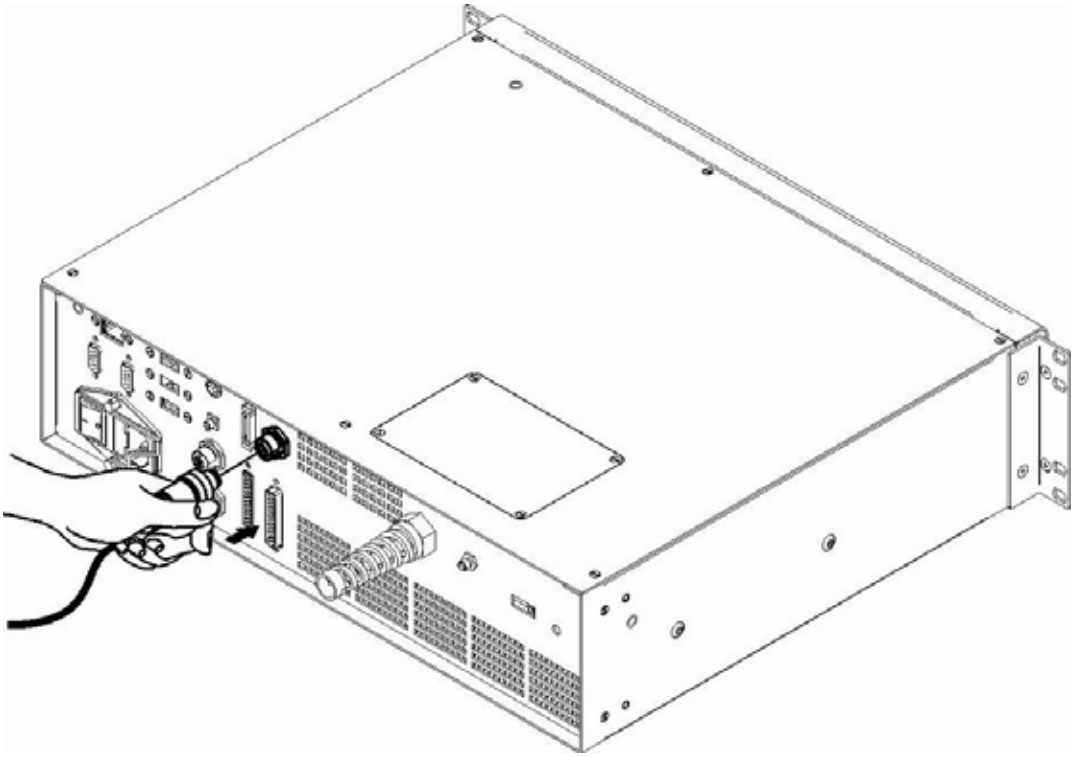


Figure 50: Resonator cable connection side rack.

Connect the other end of the cable to the resonator.

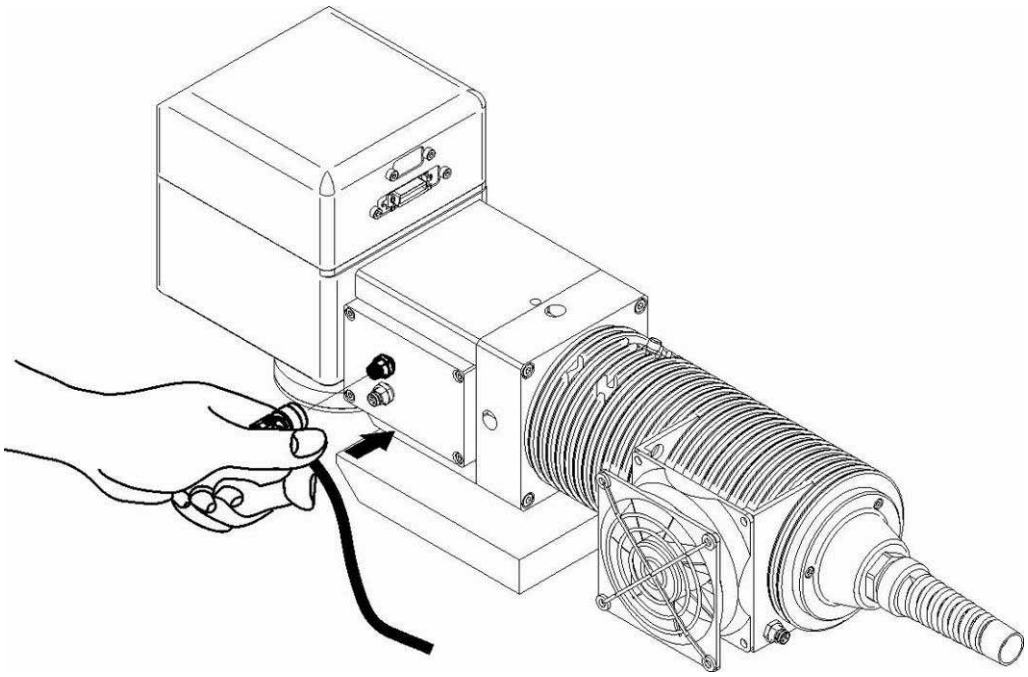


Figure 51: Resonator cable connection side resonator.

2.7.10 FAN CABLE CONNECTION

Connect fan cable to resonator.

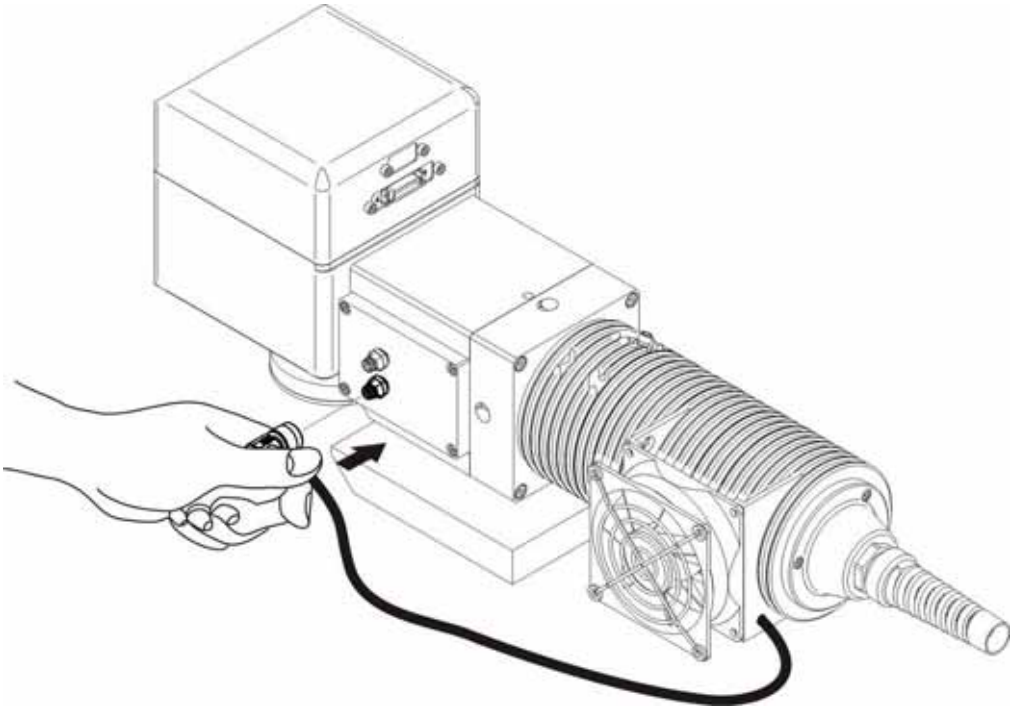


Figure 52: Resonator fan cable connection.

2.7.11 RS232 CONNECTION

Connect the RS232 serial protocol to drive away with the marking system.

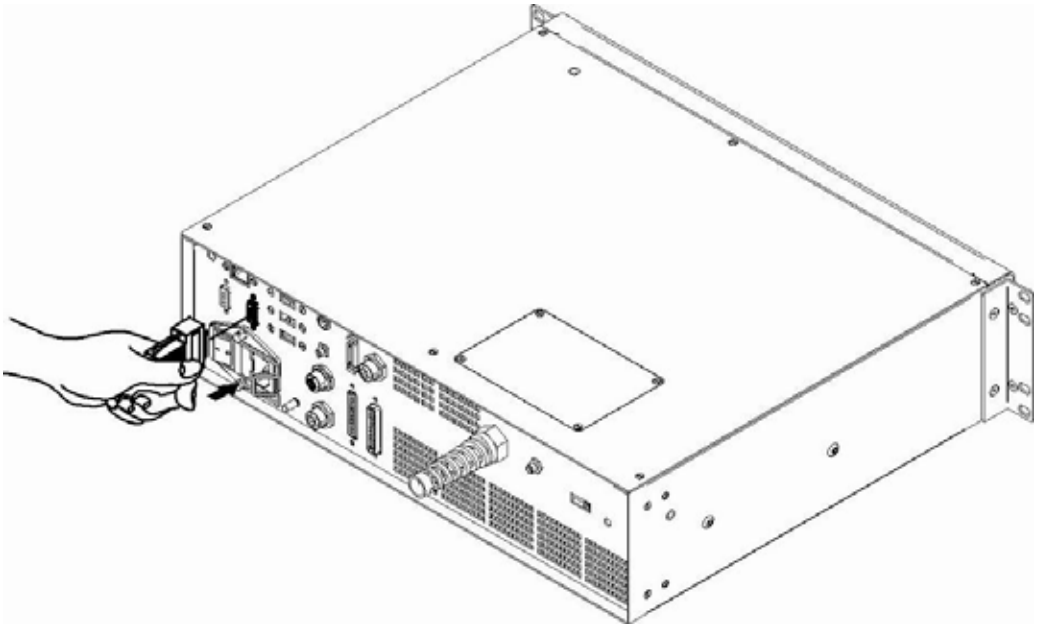


Figure 53: RS232 connection.

2.7.12 POWER SUPPLY CABLE CONNECTION

Connecting power supply cable.

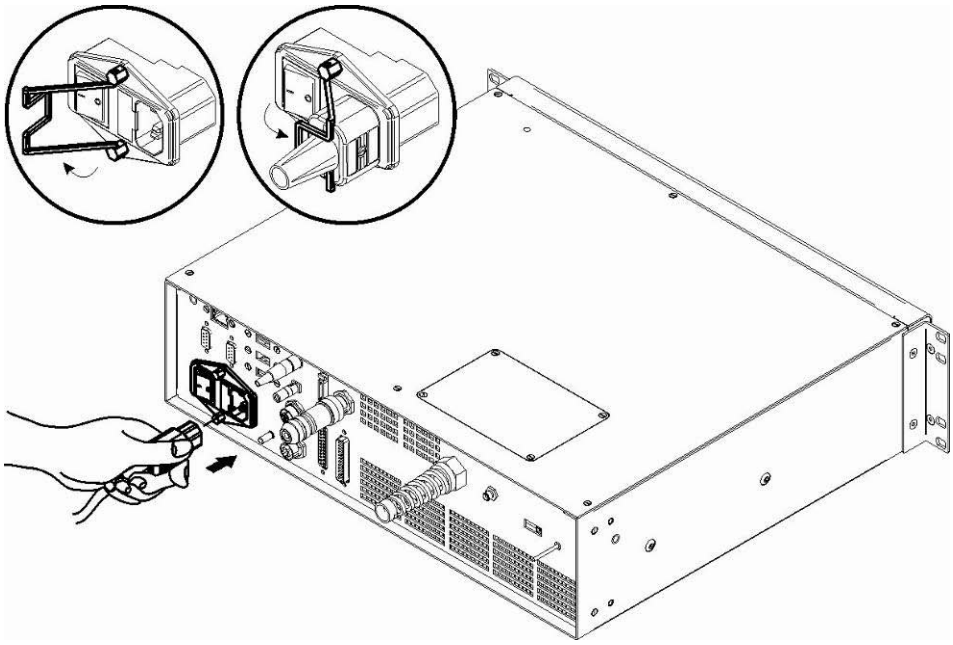


Figure 54: Power supply cable connection.

NOTE:
Lock the plug with the retaining clamp to avoid accidental disconnection.

2.7.13 GROUND CONNECTION

To ensure high electrical noise immunity it is strongly recommended to connect the chassis to earth plant.

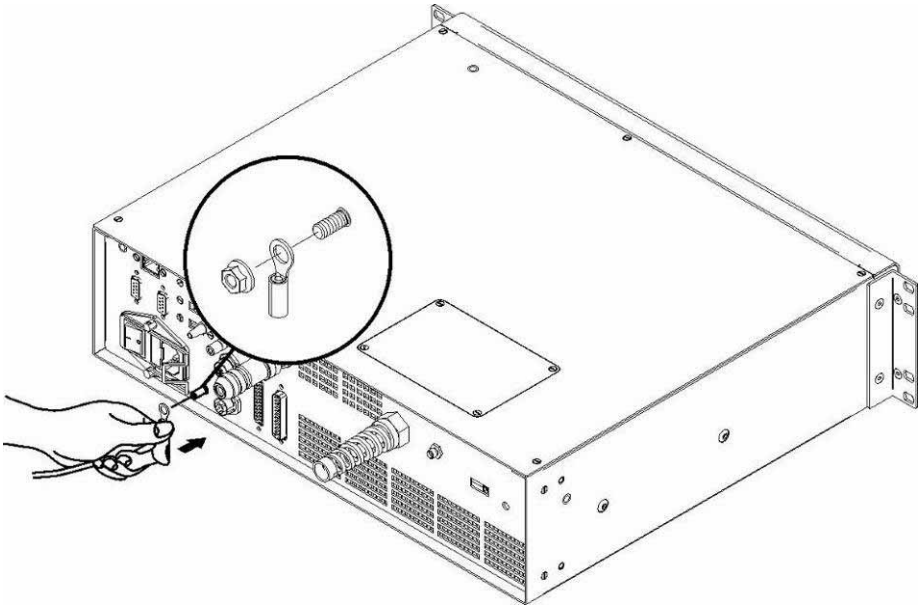


Figure 55: Groung connection.

2.7.14 LOCAL CONTROL MODE CONNECTION

To use the marking system in “Local Control” mode is necessary to install a mouse, keyboard and monitor to the system. Connect the monitor and input devices as shown below:

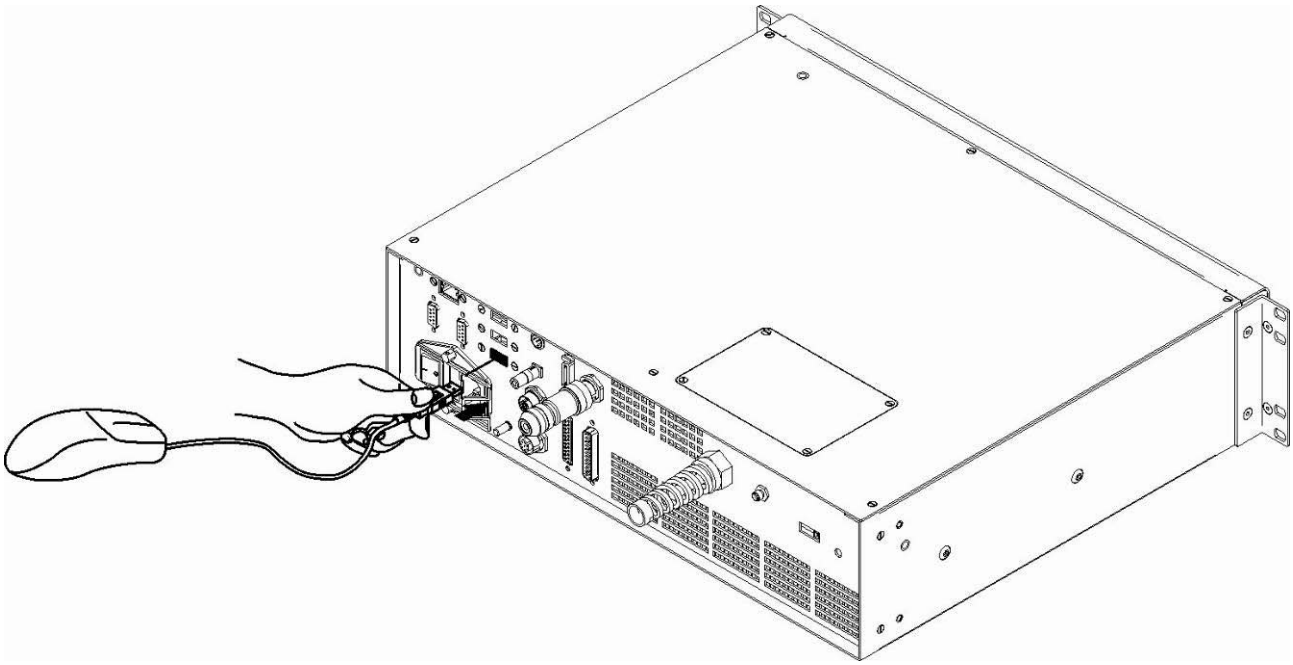


Figure 56: USB mouse connection.

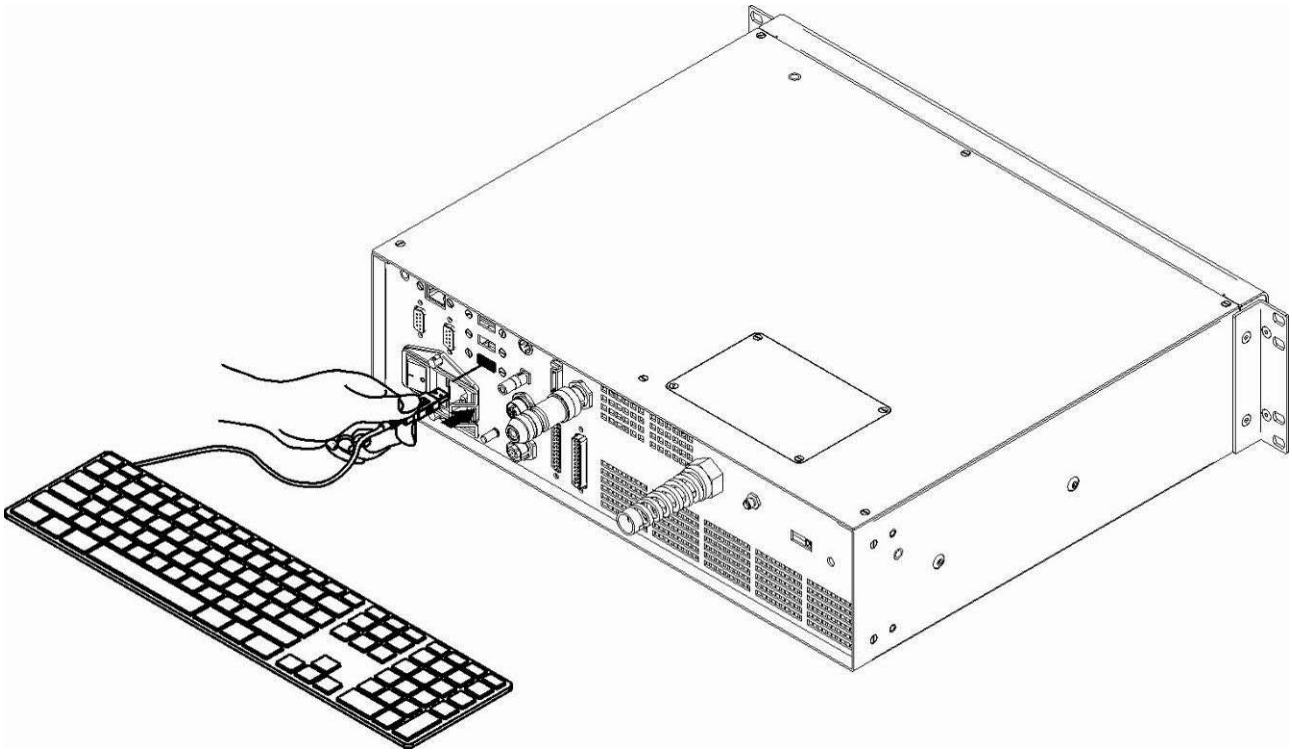


Figure 57: USB keyboard connection.

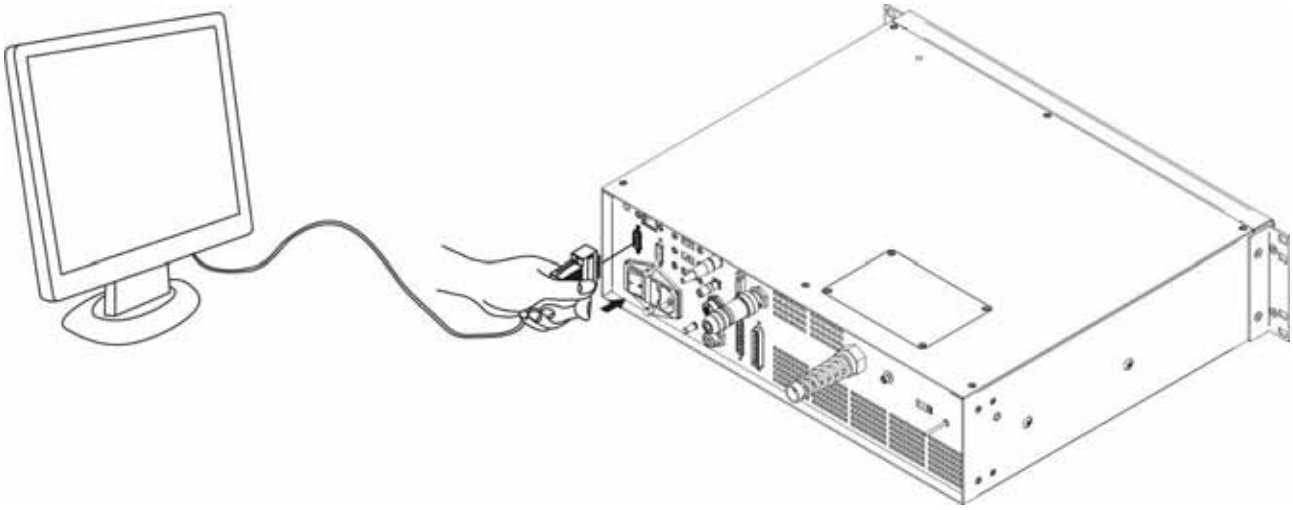


Figure 58: VGA monitor connection.

NOTE:
Minimum resolution 800 x 600.

2.7.15 REMOTE CONTROL MODE CONNECTION

To use the marking system in “Remote Control” mode is necessary to connect a network cable:

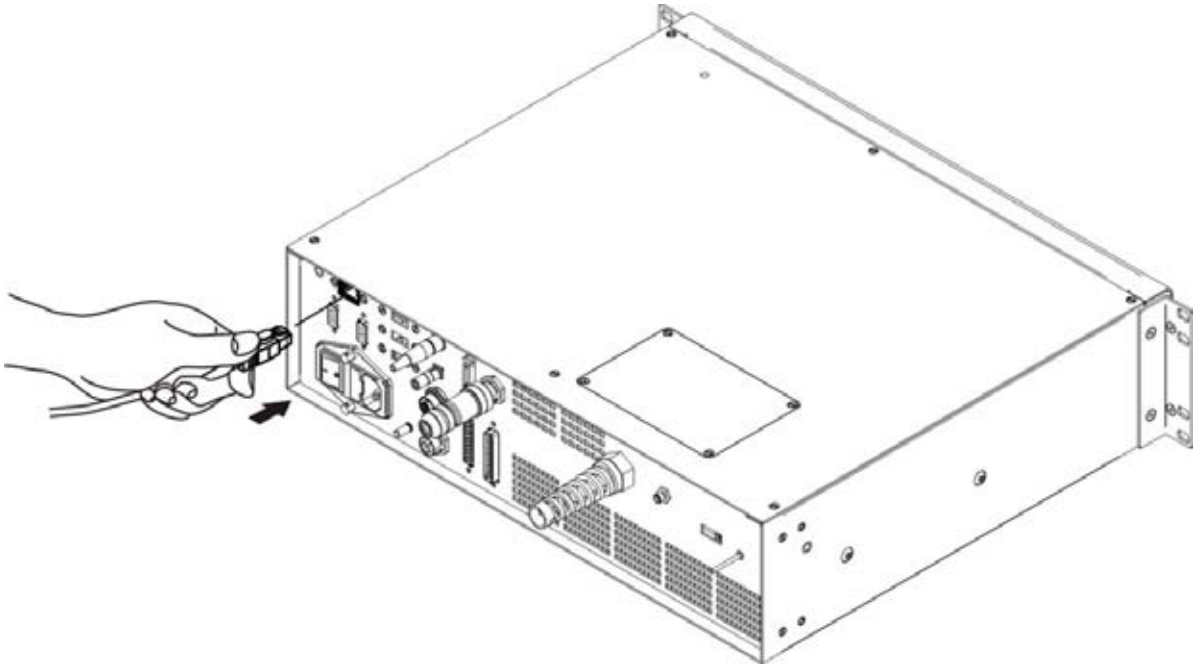


Figure 59: RJ45 Ethernet connection.

NOTE:
Ethernet TCI/IP 10, 100 Mbit.

3 : USE AND OPERATION

3.1 TURNING ON SEQUENCE

1ST: before turning on the marking system, be sure that the system are connected as previously described. Check presence of voltage power supply connection, interlock connector and Command Box connector. Check that "*KEY*" and "*ENABLE*" commands on the rack front panel are disabled (see figure 76).

2ND: turn on the main switch in the back of the control rack:

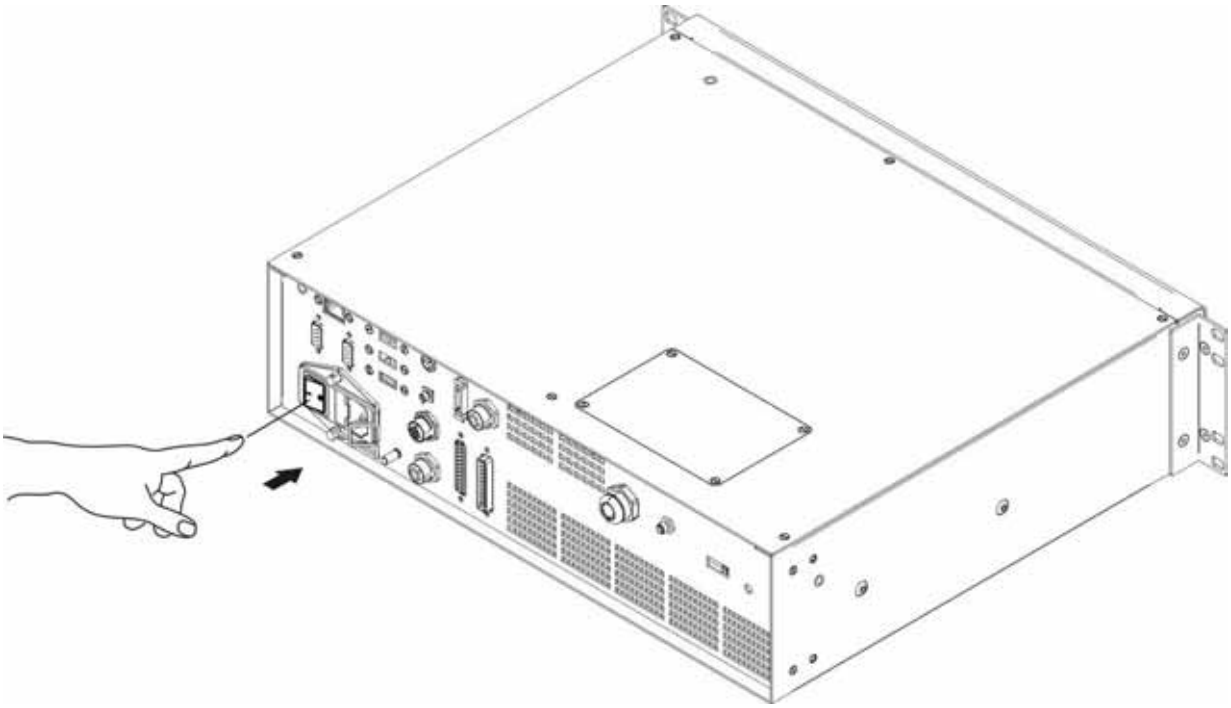


Figure 60: Power on.

During booting-up, status led on the rack front panel will be blinking green.

3RD: wait the end of the booting-up. The status led on the rack will be steady green.

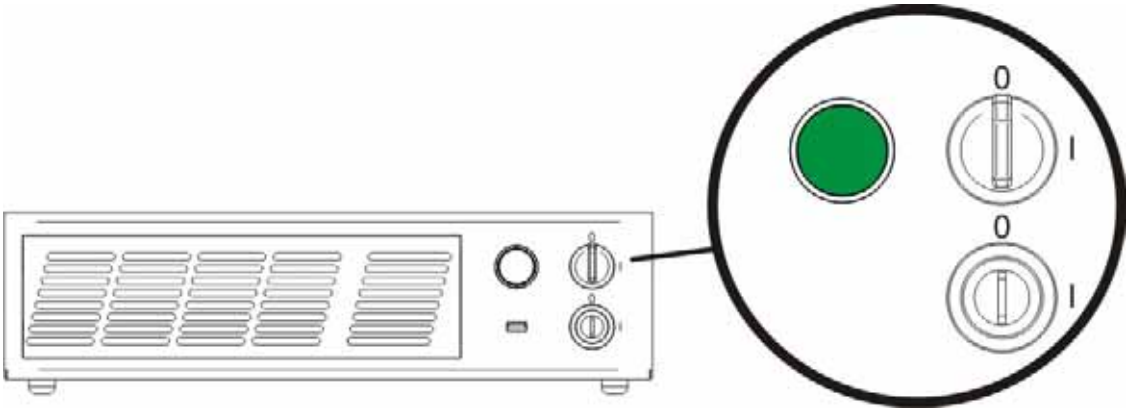


Figure 61: Status leds display.

4TH: activate the command "*KEY*", by rotating it clockwise:

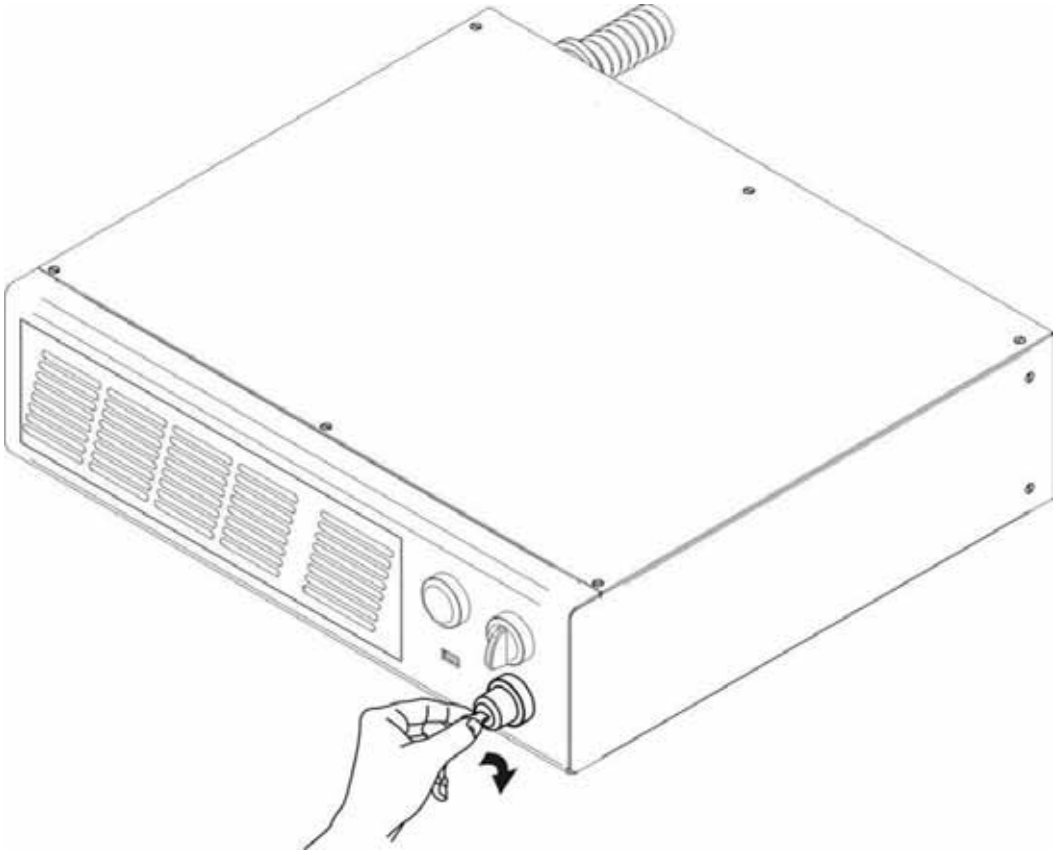


Figure 62: Enable command KEY.

When the "*KEY*" command is enabled, the status LED on the rack will be blinking orange for about 20 sec. (laser source warm-up).

5TH: wait the end of the laser source warm-up. The status led on the rack and the led bar on the Scan Head will be steady orange.

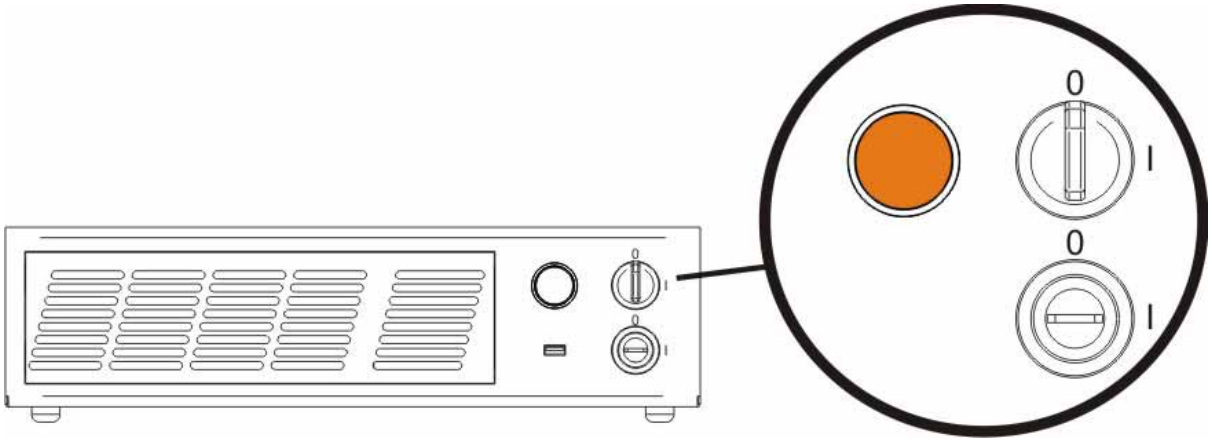


Figure 63: Status leds display.

6TH: activate the "*ENABLE*" command by rotating it clockwise:

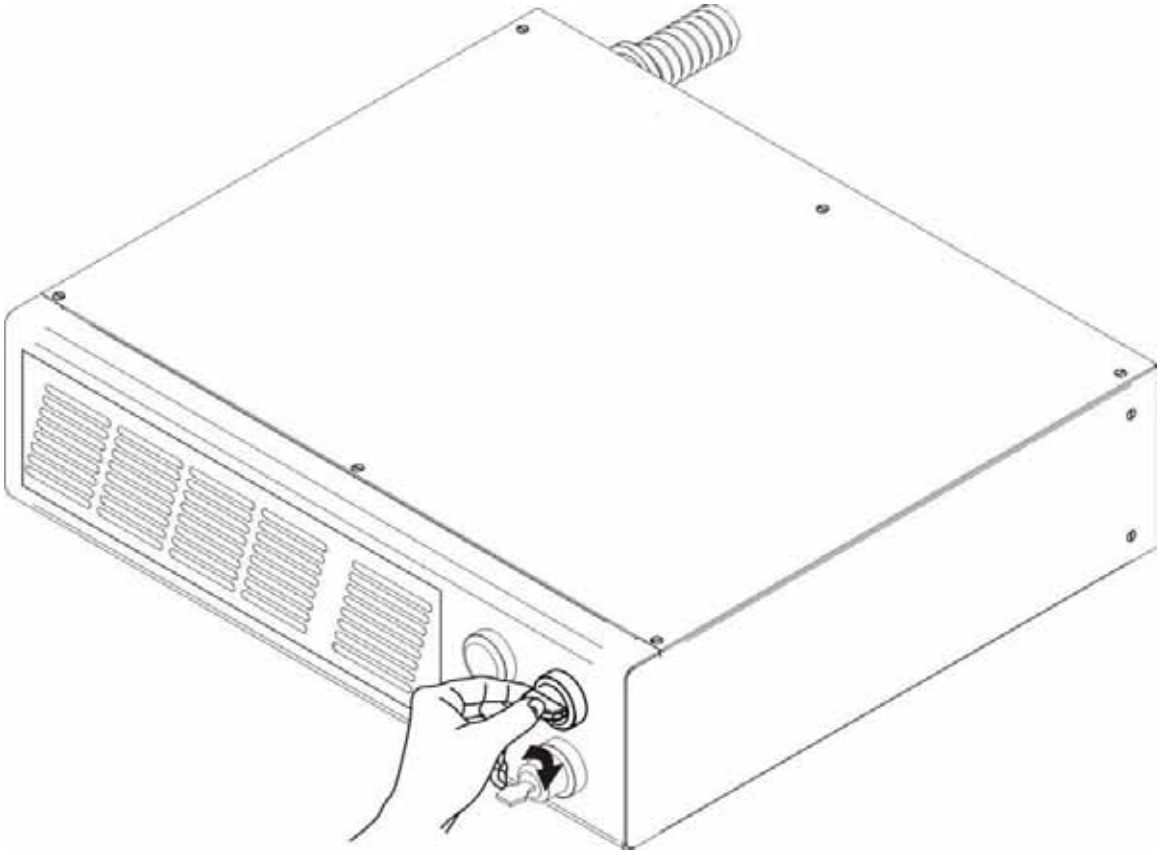


Figure 64: Enable command ENABLE.

The laser system is ready to mark. The status led on the rack will turn red.

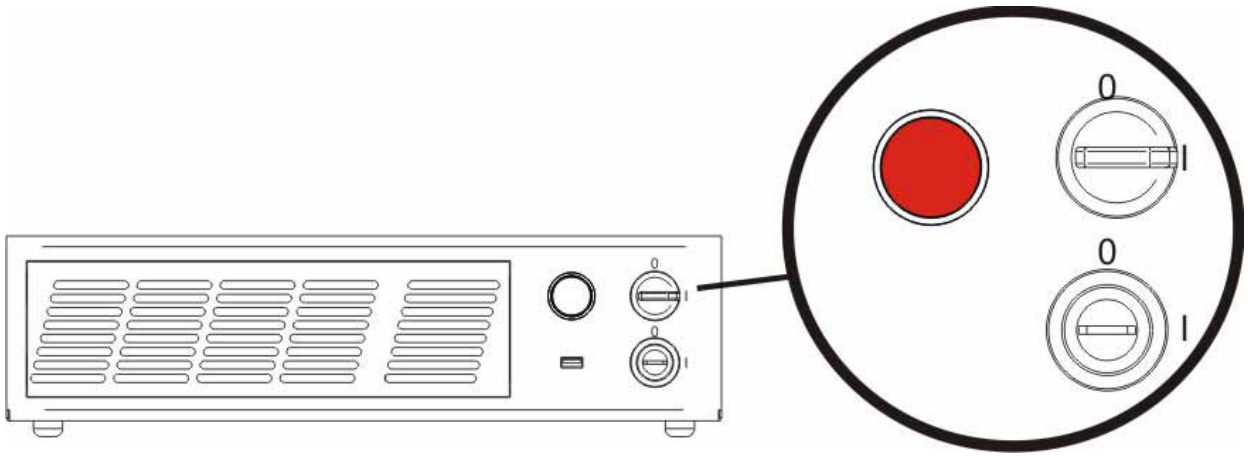


Figure 65: Status leds display.

RESUME TABLE

STATUS	STATUS LED	INPUT STATUS (*)	OUTPUT STATUS (*)
SYSTEM BOOTING UP	BLINKING GREEN (1Hz)	KEY LOW ENABLE LOW	ALARM ON POWER ON OFF ENABLE OUT OFF LASER BUSY OFF
WAIT FOR START	STEADY GREEN	KEY LOW ENABLE LOW	ALARM OFF POWER ON OFF ENABLE OUT OFF LASER BUSY OFF
WARMING UP	BLINKING ORANGE (1Hz)	KEY HIGH ENABLE LOW	ALARM OFF POWER ON OFF ENABLE OUT OFF LASER BUSY OFF
STANDBY SHUTTER CLOSED	STEADY ORANGE	KEY HIGH ENABLE LOW	ALARM OFF POWER ON ON ENABLE OUT OFF LASER BUSY OFF
READY	STEADY RED	KEY HIGH ENABLE HIGH	ALARM OFF POWER ON ON ENABLE OUT ON LASER BUSY OFF
EMISSION	STEADY RED	KEY HIGH ENABLE HIGH	ALARM OFF POWER ON ON ENABLE OUT ON LASER BUSY ON

(*) See paragraph 4.1.10 for more information.

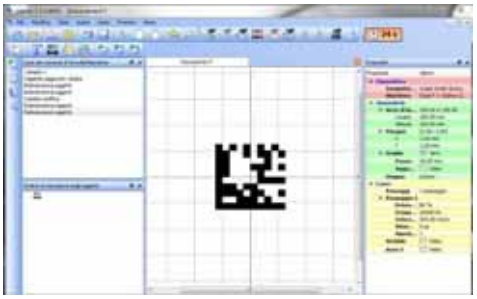
3.1.1 ADVICE ON USING THE SYSTEM

If the marking system is used in manual mode you need to connect Command Box connector as described before. In this way you are able to control the marking system directly on rack front panel.

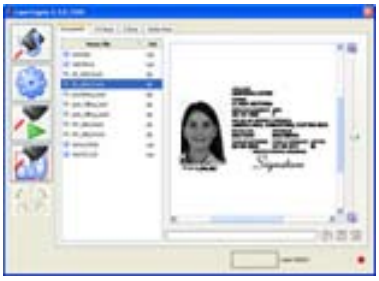
If the marking system is used in automatic mode it is recommended to enable permanently KEY and ENABLE commands positioned on rack front panel and to use remote signals (EXT_KEY and EXT_ENABLE) available on Command Box connector. This part is supplied with the product and you can connect external controls wiring connector contacts following pins description on next chapter.

STAND-ALONE mode

The STAND-ALONE mode (with monitor, keyboard and mouse connected) is optimal to fully benefit of the ALL-IN-ONE Rack architecture characteristics.



+



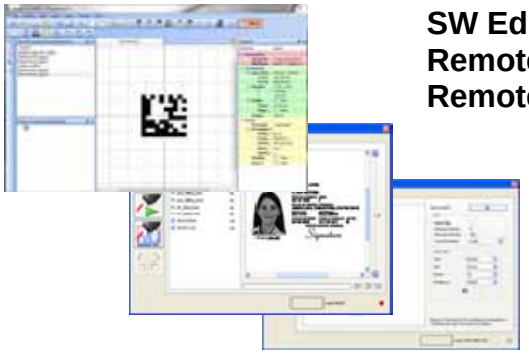
=

SW Editor
SW Engine
Correction Matrix
Laser Control
Galvo Control

MASTER-SLAVE mode

Keyboard, mouse and monitor are not necessary in this configuration.

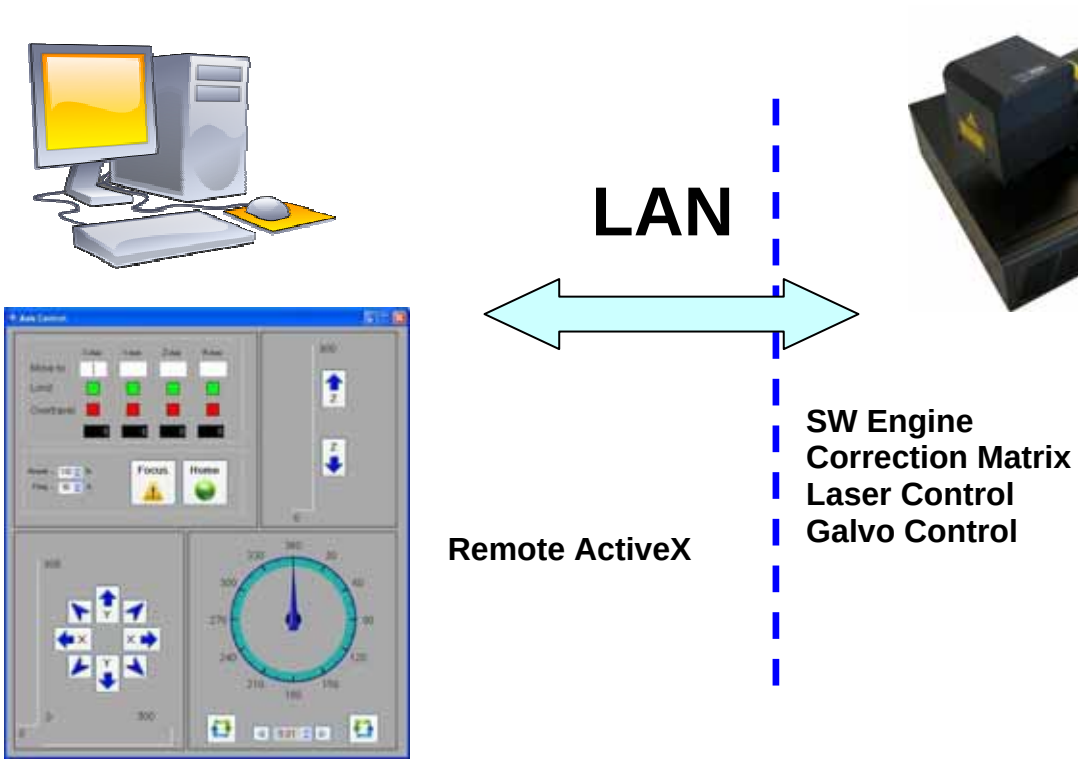
LAN



SW Editor
Remote SW Engine
Remote Active-X

SW Engine
Correction Matrix
Laser Control
Galvo Control

New IP ActiveX allows OEM integrators and end-users to create customized Applications and User Interfaces via Ethernet.
Local or remote ActiveX control interface is available with the same commands to allow the use of the same application developed for both local and remote configurations.



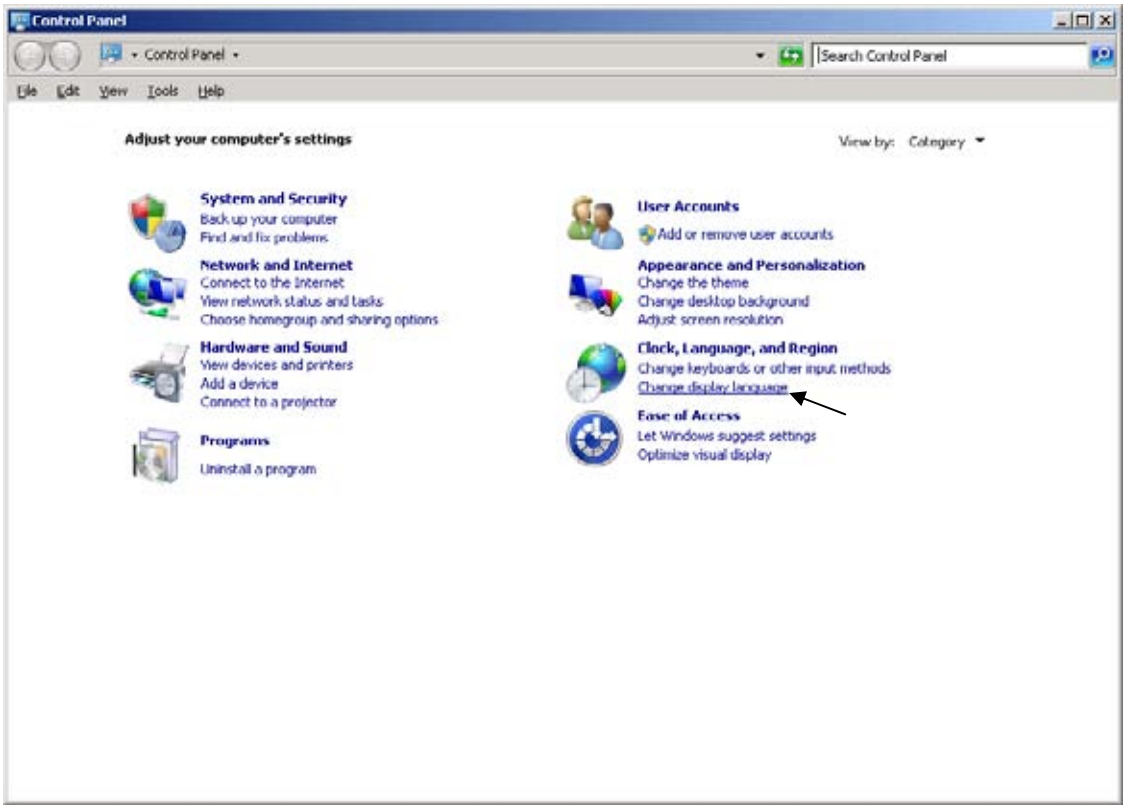
3.1.1.1 Customize the operating system language and keyboard layout

The marking system allows you to personalize the operating system changing the language used in menus and dialogs, languages you can use to enter text and keyboard layout.

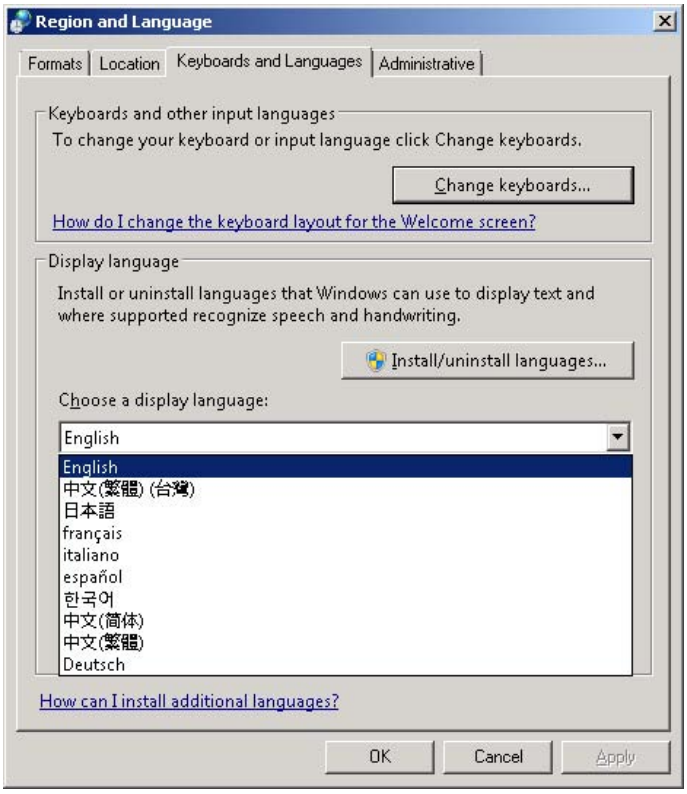
NOTE:
In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the system (paragraph 2.7.14).

- Turn OFF and ON the system and wait the end of the booting-up (the status led on the rack must be steady green)
- From the main screen click on *START/Control Panel*

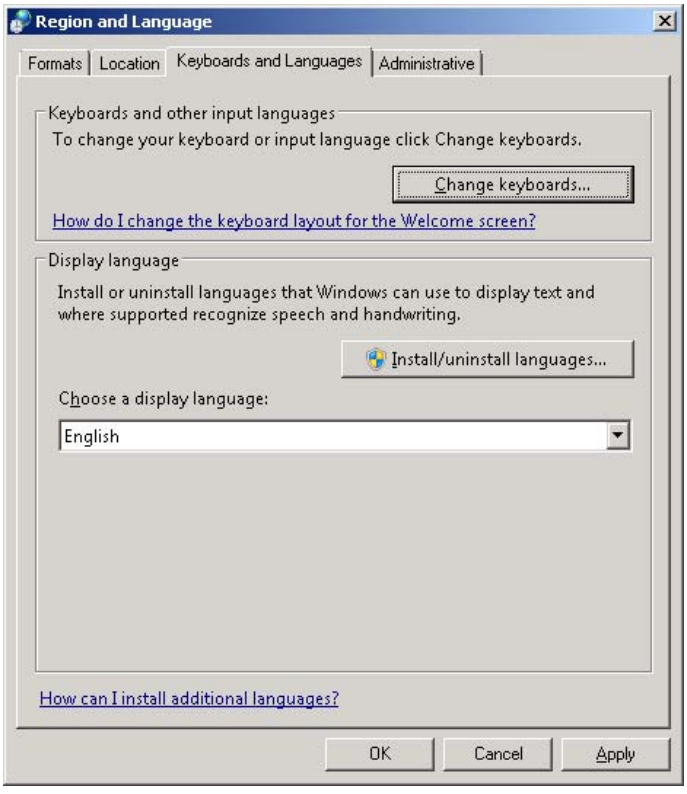
- Select *Change display language*:



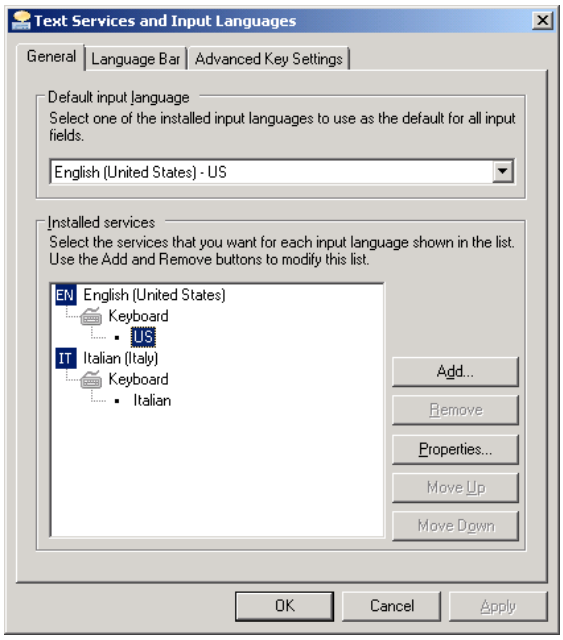
o In *"Keyboards and Languages"* select and choose the desired language.



o Select *Change keyboards* to change your keyboard or input language:

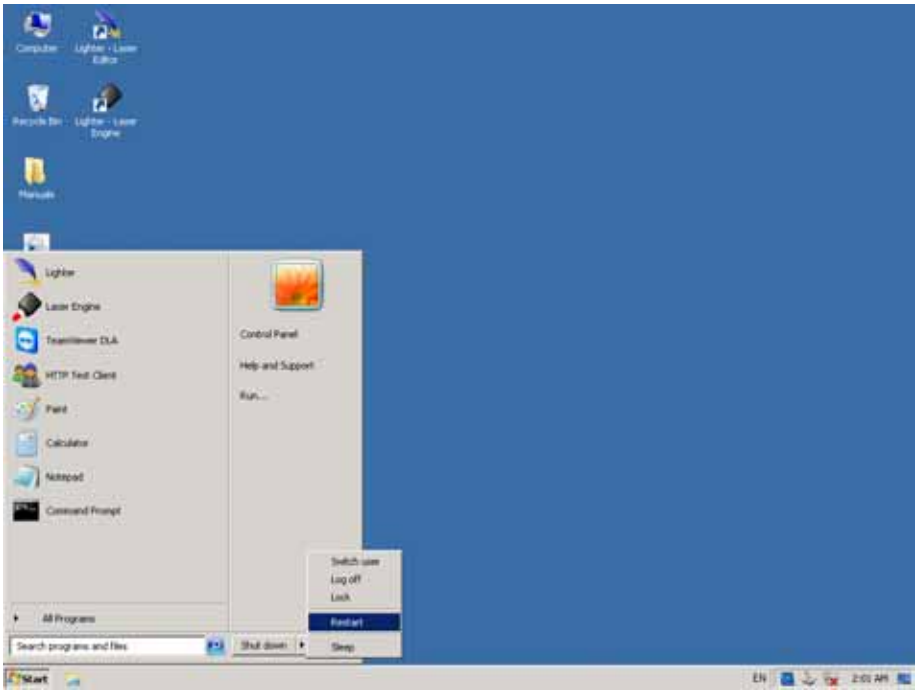

Region and Language
Formats
Location
Keyboards and Languages
Administrative
Keyboards and other input languages
To change your keyboard or input language click Change keyboards.
Change keyboards...
How do I change the keyboard layout for the Welcome screen?
Display language
Install or uninstall languages that Windows can use to display text and where supported recognize speech and handwriting.
Install/uninstall languages...
Choose a display language:
English
How can I install additional languages?
OK
Cancel
Apply

- Select now input languages and press *OK*:



- Close all the open screen and double click on the `Shortcut to save-data.bat` icon in the Desktop screen:

- Restart the system in order to save the new settings:



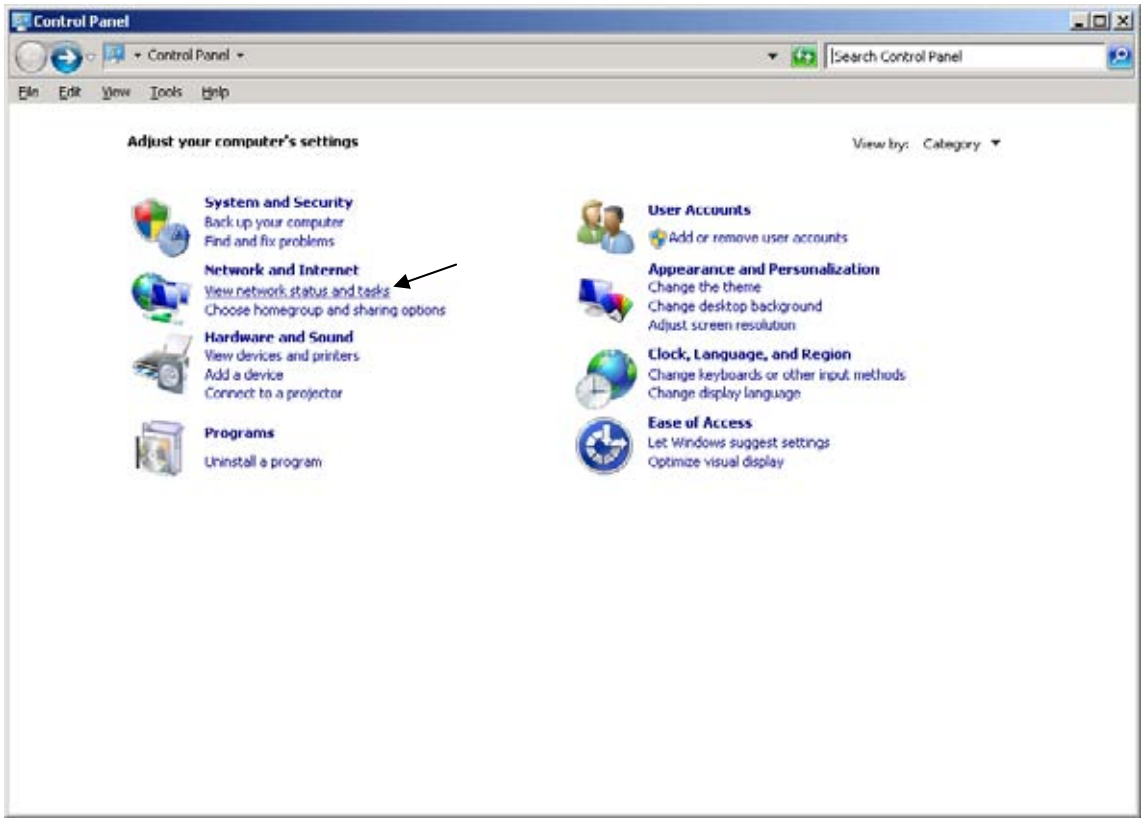
3.1.1.2 Change the LAN configuration and IP address

The system allows you to change the LAN configuration and IP address.

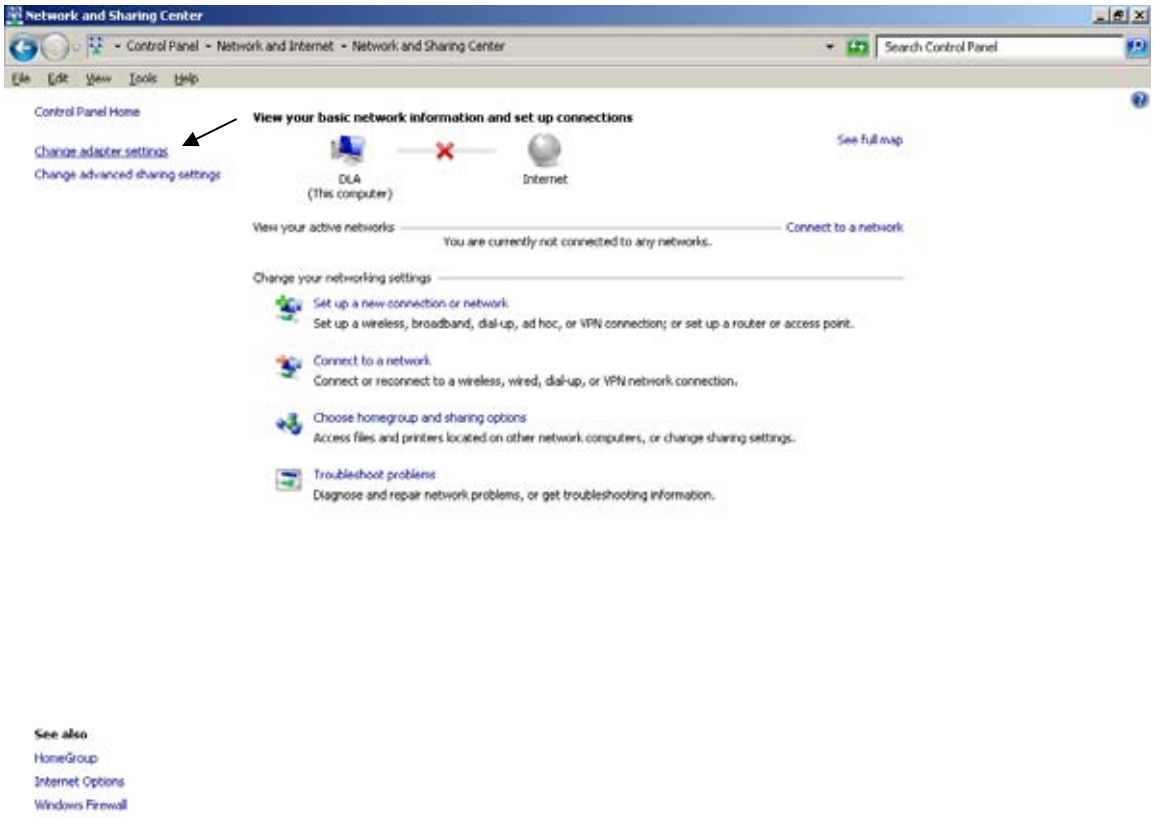
NOTE:
In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the system (paragraph 2.7.14).

- Turn OFF and ON the system and wait the end of the booting-up (the status led on the rack must be steady green)
- From the main screen click on *START/Control Panel*

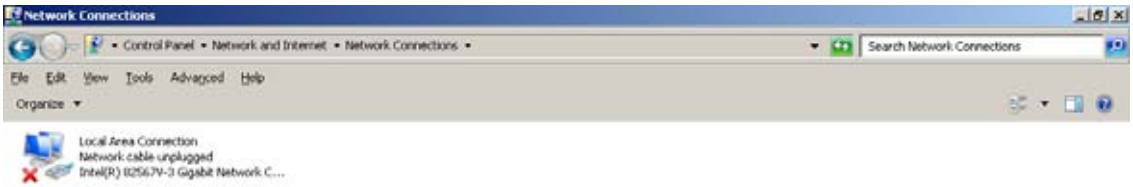
- Select *View network status and tasks*:



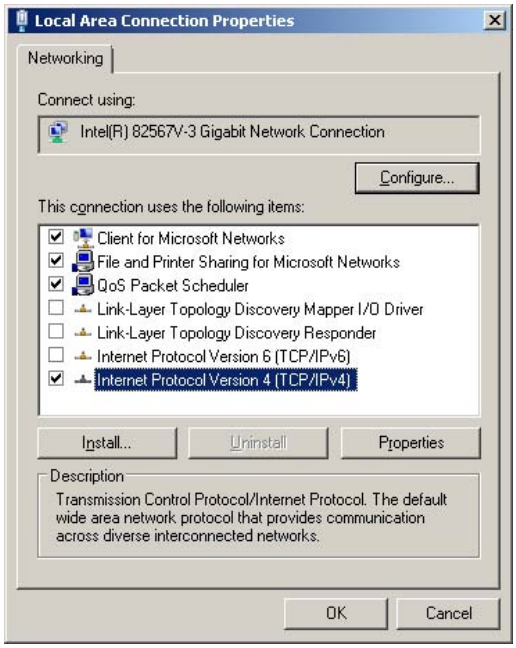
- In the “Network and Sharing Center” screen select *Change adapter settings*:

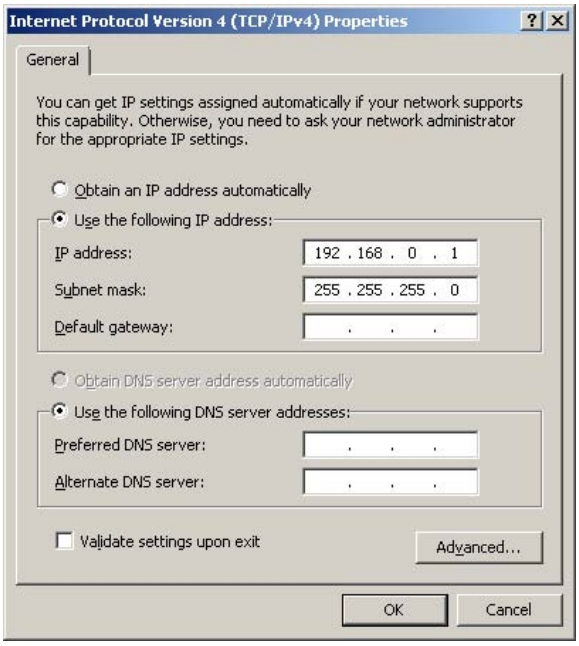

Network and Sharing Center
Control Panel ▸ Network and Internet ▸ Network and Sharing Center
Search Control Panel
File Edit View Tools Help
Control Panel Home
Change adapter settings
Change advanced sharing settings
View your basic network information and set up connections
See full map
DLA
(This computer)
Internet
View your active networks
Connect to a network
You are currently not connected to any networks.
Change your networking settings
Set up a new connection or network
Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or access point.
Connect to a network
Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.
Choose homegroup and sharing options
Access files and printers located on other network computers, or change sharing settings.
Troubleshoot problems
Diagnose and repair network problems, or get troubleshooting information.
See also
HomeGroup
Internet Options
Windows Firewall

- In the “Network Connections” screen double click on *Local Area Connection*


Network Connections
Control Panel ▸ Network and Internet ▸ Network Connections ▸
Search Network Connections
File Edit View Tools Advanced Help
Organize
Local Area Connection
Network cable unplugged
Intel(R) 82567V-3 Gigabit Network C...

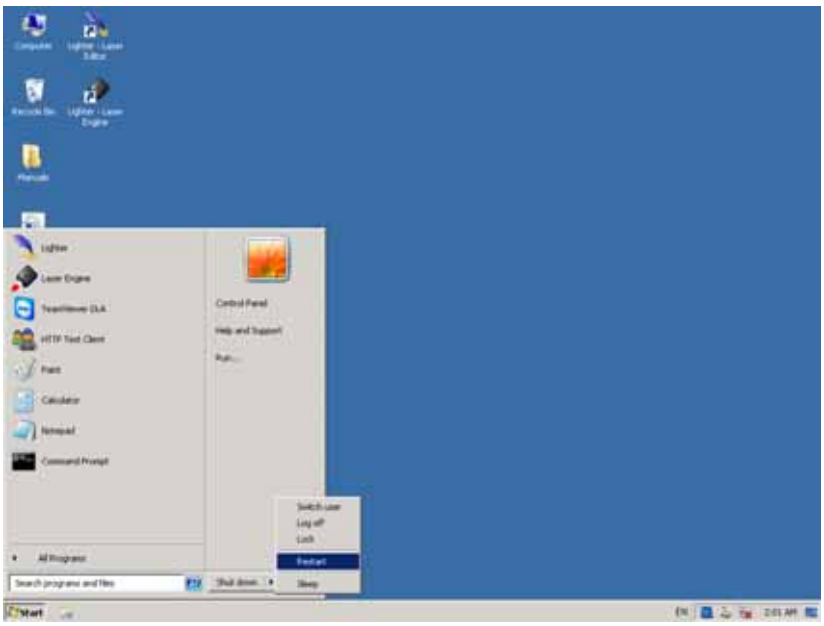
- In the “Local Area Connection Properties” screen double click on *Internet Protocol Version 4 (TCP/IPv4)*
- In the “Internet Protocol Version 4 (TCP/IPv4) Properties” you can change the IP address and configuration




Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 0 . 1
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

- Close all the open screen and double click on the `Shortcut to save-data.bat` icon in the Desktop screen:

- Restart the system in order to save the new settings:

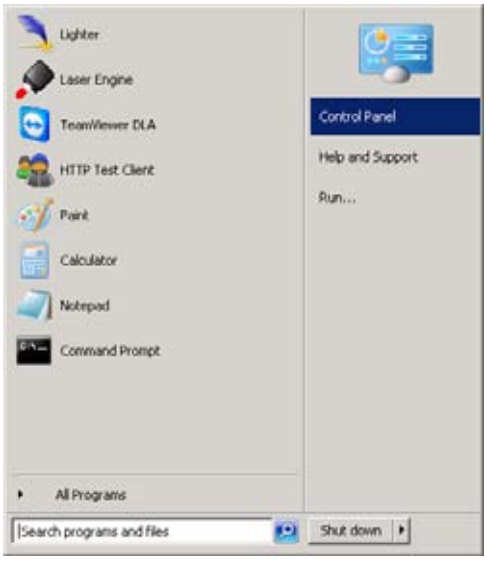


3.1.1.3 Change the Video setting

The system system allows you to change the Video setting.

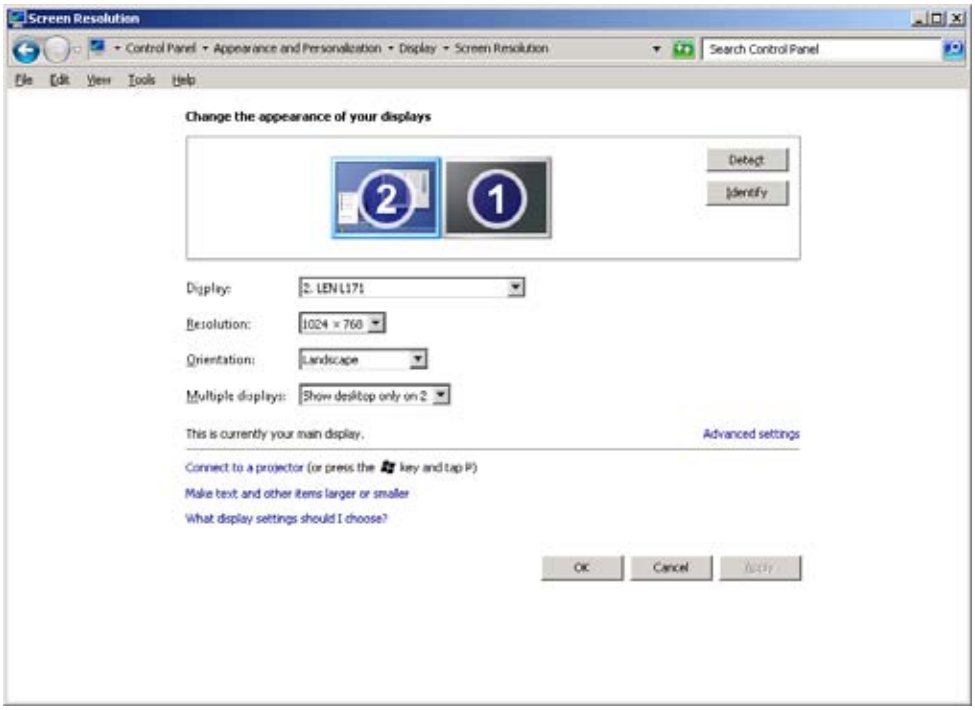
NOTE:
In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the system (paragraph 2.7.14).

- Turn OFF and ON the system and wait the end of the booting-up (the status led on the rack must be steady green)
- From the main screen click on *START/Control Panel*



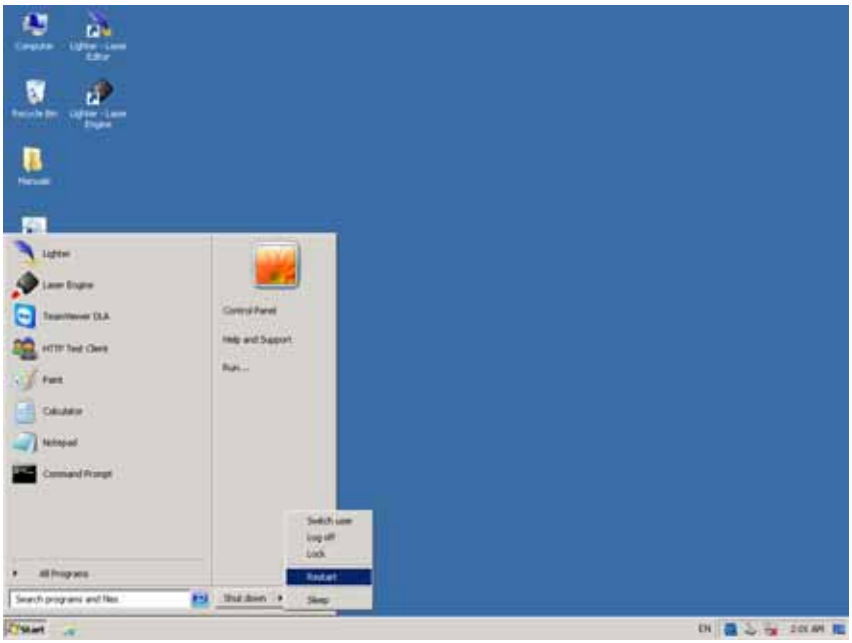
- Select *Adjust screen resolution*:

- In the Display Properties screen select the desired Screen resolution and Color quality:



- Close all the open screen and double click on the `Shortcut to save-data.bat` icon in the Desktop screen:

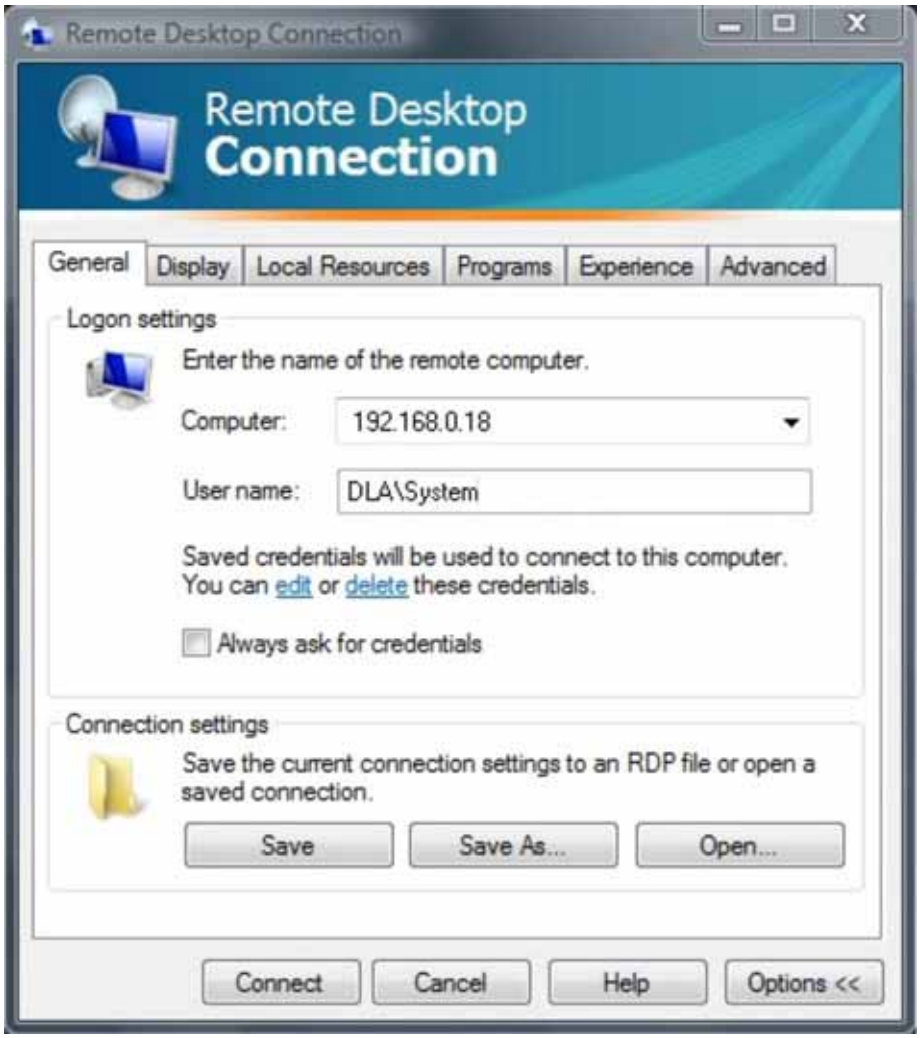
- Restart the system in order to save the new settings:



3.1.1.4 Connect to the Remote Computer using Remote Desktop Connection

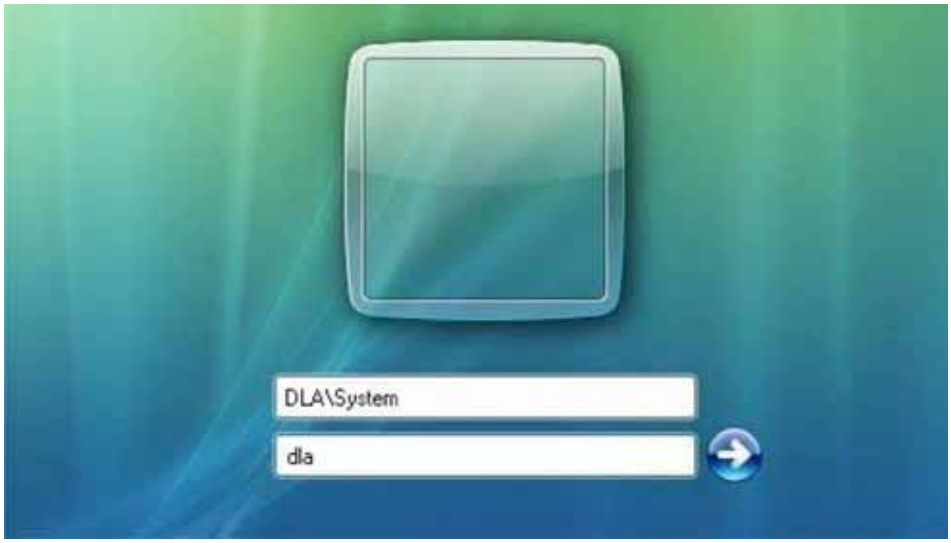
To connect the laser system to a remote Windows® based computer, follow these steps:

- Turn on the marking system
- Make sure that both the marking system and remote computer are connected to the LAN
- Click *Start/All Programs/Accessories*, and then click *Remote Desktop Connection*
- Click *Options*
- In the *Computer* list, type the host name or the IP address of the computer to which you want to connect
- Type the user name, password, and domain (if applicable) of an account to which you have allowed remote access into the corresponding boxes, and then click *Connect*



- In the **Log On to Windows** dialog box that appears, type the password of the account with remote access privileges into the **Password** box:

  User name: **system**
  Password: **dla**



- In the **Log on to** list, if applicable, select the domain or remote computer that you want, and then click *OK*

  The remote desktop is displayed in a window on the desktop. The remote computer is locked during this session

- To disconnect the session, click the *Close* button in the session window, and then click *OK* when you are prompted to disconnect the Windows® session.

3.1.1.5 Recover the system using USB recovery disk

The marking system is provided with a USB recovery disk that can be used in case:

- ***the system does not boot*** because the ***CF disk*** containing the operating system ***is corrupted***;
- ***Lighter doesn't work*** because the **SSD disk** which contains the Lighter DATA folder ***is corrupted;***

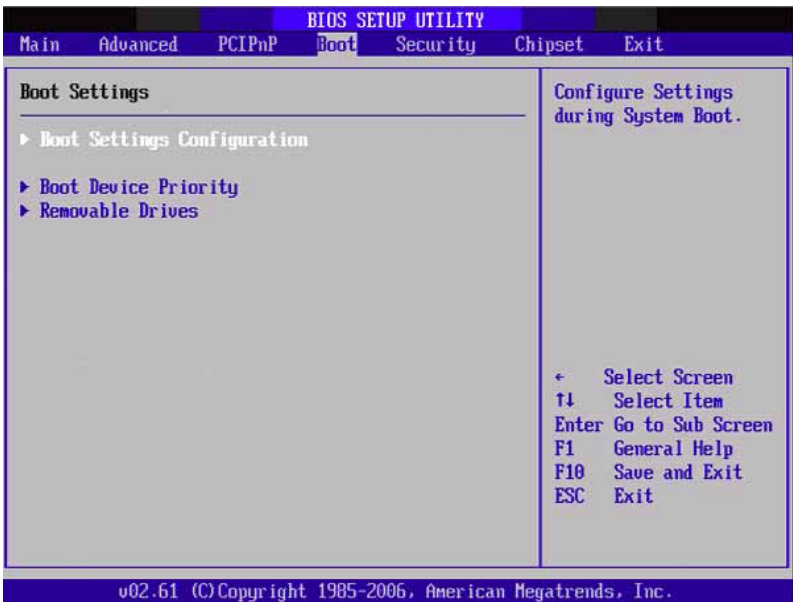
The recovery procedure, allows to go back to the factory configuration without removing the CF or the SSD from its housing.

STORAGE CONFIGURATION	
C:\ drive: CF o Operating system o Lighter Suite	D:\ drive: SSD o Lighter DATA folder: configuration files, license, layouts, projects, sequences, etc

The recovery procedure requires the ***USB recovery disk*** witch is included in the standard equipment.

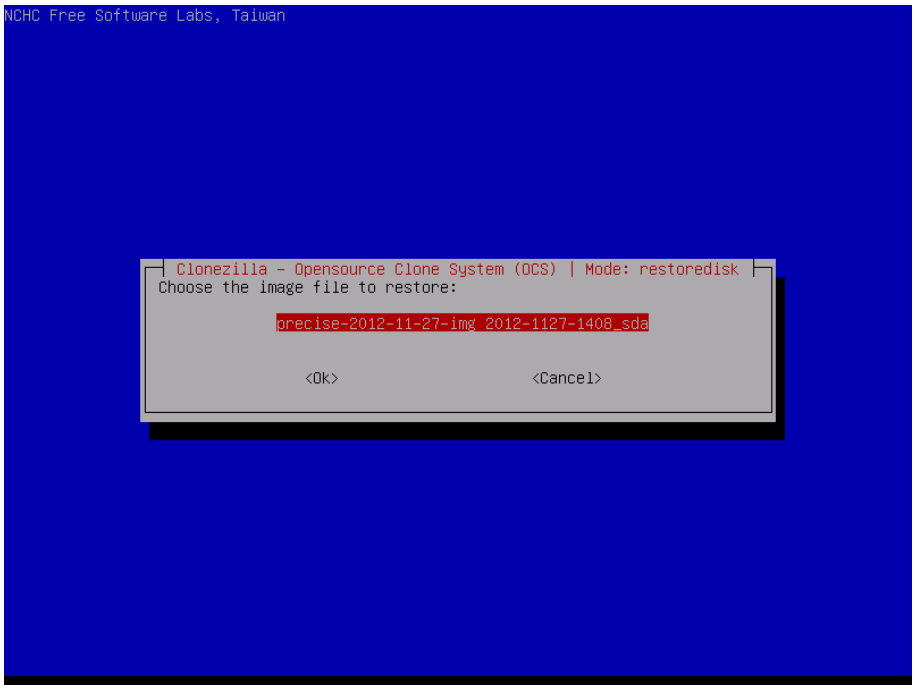
Procedure:

- Turn ***OFF*** the system
- Insert the ***USB recovery disk*** provided with the marking system in the frontal USB port of the rack
- Turn ***ON*** the system and press ***DEL*** key to enter BIOS SETUP UTILITY
- Select ***BOOT*** screen
- Select ***Hard Disk Drives***, check if the ***USB recovery disk*** is present in the list, set it as ***1st Drive*** using the ***+/- key*** and press ***ESC*** key
- Select ***Boot Device Priority***, set the ***USB recovery disk*** as ***1st Drive*** using the ***+/- key*** and press ***ESC*** key

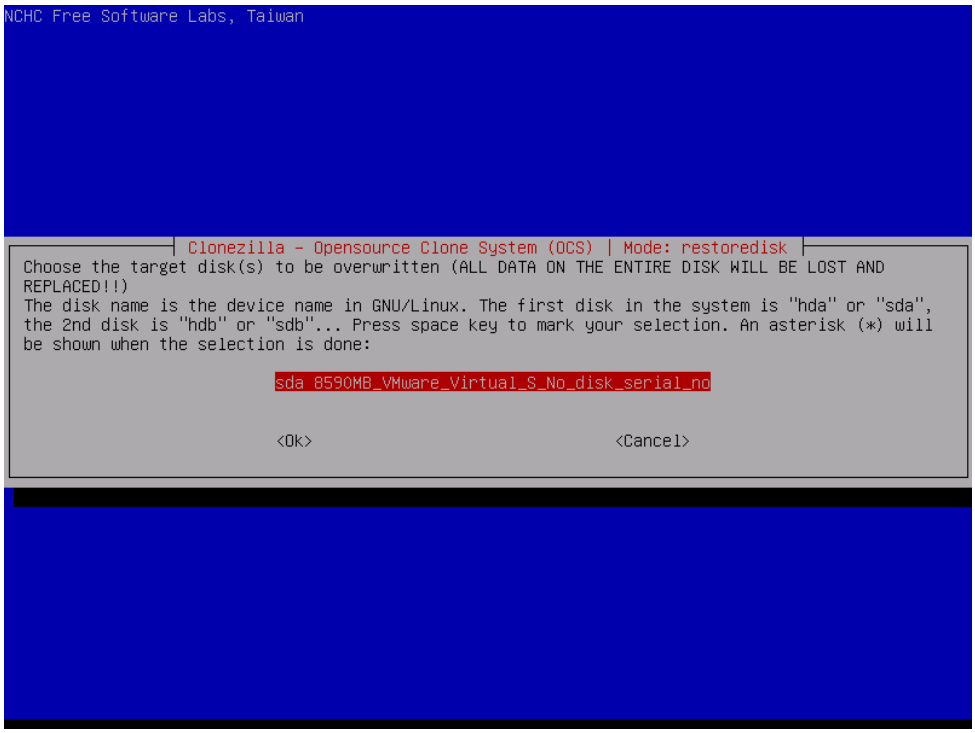


- Press ***F10*** key to Save the configuration and Exit from BIOS SETUP UTILITY
- The system will restart and ***Clonezilla live*** will boot from the USB disk
- Select ***Datalogic Recovery Disk procedure*** and press **ENTER**

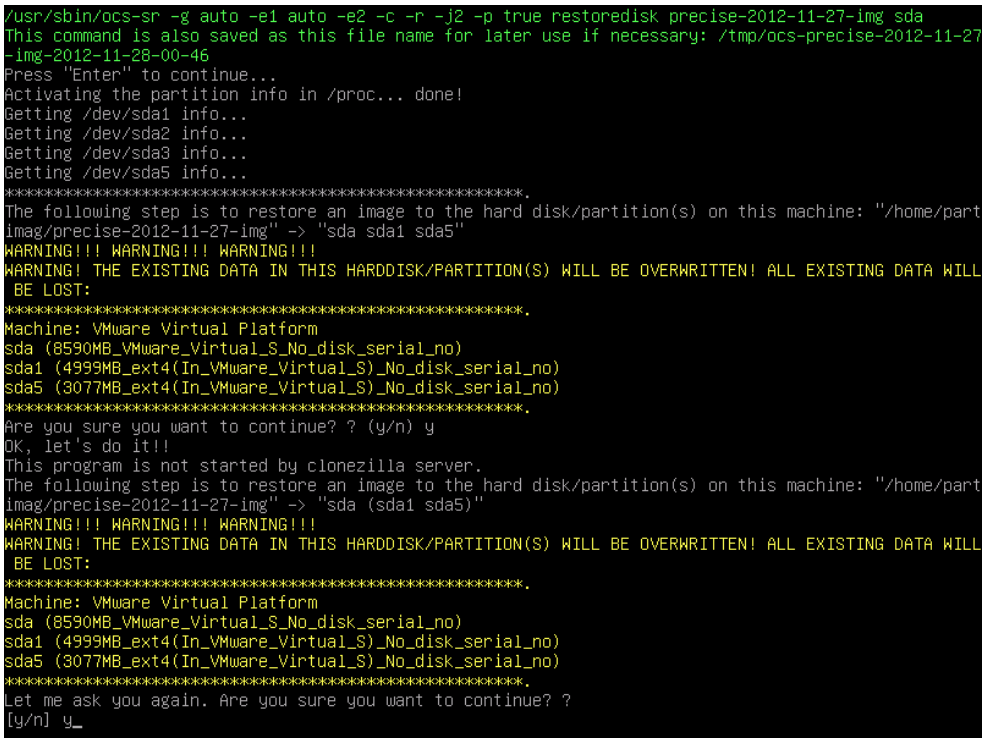
- ***Choose*** the image file to restore:
  - if you want to restore the ***C:\ drive*** which contains the operating system and Lighter Suite choose ***RESTORE_DISK_C_NEW_VL_WES7*** and press ***ENTER*** key
  - if you want to restore the ***D:\ drive*** which contains the Lighter DATA folder choose the right image between that listed below, which differ depending on the model:
    - ***VL-10IR*** -> ***RESTORE_DISK_D_VL_10IR*** and press ***ENTER*** key
    - ***VL-15IR*** -> ***RESTORE_DISK_D_VL-15IR*** and press ***ENTER*** key
    - ***VL-20IR*** -> ***RESTORE_DISK_D_VL-20IR*** and press ***ENTER*** key


NCHC Free Software Labs, Taiwan
Clonezilla - Opensource Clone System (OCS) | Mode: restoredisk
Choose the image file to restore:
precise-2012-11-27-img 2012-1127-1408_sda
<Ok>
<Cancel>

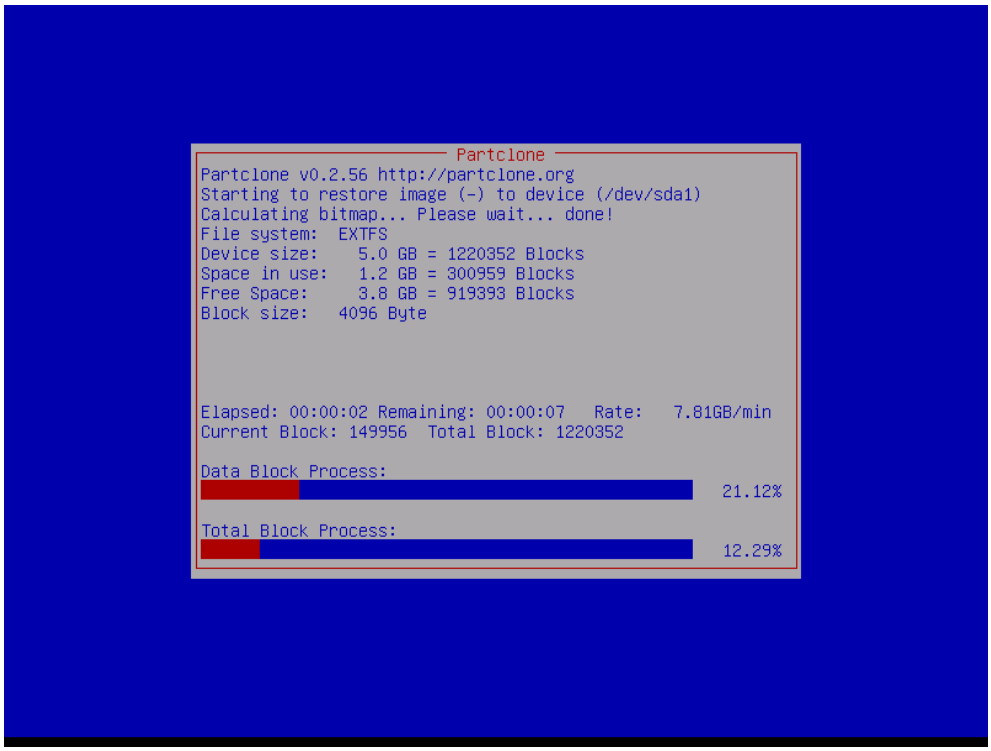
- ***Choose* the target disk to be overwritten** and press ***ENTER*** key
  - ***Compact Flash disk drive*** if you are restoring the disk ***C:\ drive***
  - ***SSD disk drive*** or ***Flash Disk drive*** if you are restoring the disk ***D:\ drive***


NCHC Free Software Labs, Taiwan
Clonezilla - Opensource Clone System (OCS) | Mode: restoredisk
Choose the target disk(s) to be overwritten (ALL DATA ON THE ENTIRE DISK WILL BE LOST AND REPLACED!!)
The disk name is the device name in GNU/Linux. The first disk in the system is "hda" or "sda", the 2nd disk is "hdb" or "sdb"... Press space key to mark your selection. An asterisk (*) will be shown when the selection is done:
sda 8590MB_VMware_Virtual_S_No_disk_serial_no
<Ok>
<Cancel>

- Clonezilla will ask you to ***confirm twice***:
  - ***Press Y*** key and then ***ENTER*** key to confirm the 1st time
  - ***Press Y*** key and then ***ENTER*** key to confirm the 2st time


/usr/sbin/ocs-sr -g auto -e1 auto -e2 -c -r -j2 -p true restoredisk precise-2012-11-27-img sda
This command is also saved as this file name for later use if necessary: /tmp/ocs-precise-2012-11-27-img-2012-11-28-00-46
Press "Enter" to continue...
Activating the partition info in /proc... done!
Getting /dev/sda1 info...
Getting /dev/sda2 info...
Getting /dev/sda3 info...
Getting /dev/sda5 info...
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/partimag/precise-2012-11-27-img" -> "sda sda1 sda5"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL BE LOST:
Machine: VMware Virtual Platform
sda (8590MB_VMware_Virtual_S_No_disk_serial_no)
sda1 (4999MB_ext4(In_VMware_Virtual_S)_No_disk_serial_no)
sda5 (3077MB_ext4(In_VMware_Virtual_S)_No_disk_serial_no)
Are you sure you want to continue? ? (y/n) y
OK, let's do it!!
This program is not started by clonezilla server.
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/partimag/precise-2012-11-27-img" -> "sda (sda1 sda5)"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL BE LOST:
Machine: VMware Virtual Platform
sda (8590MB_VMware_Virtual_S_No_disk_serial_no)
sda1 (4999MB_ext4(In_VMware_Virtual_S)_No_disk_serial_no)
sda5 (3077MB_ext4(In_VMware_Virtual_S)_No_disk_serial_no)
Let me ask you again. Are you sure you want to continue? ?
[y/n] y_

- **Wait** until the procedure is completed


Partclone
Partclone v0.2.56 http://partclone.org
Starting to restore image (-) to device (/dev/sda1)
Calculating bitmap... Please wait... done!
File system: EXTFS
Device size: 5.0 GB = 1220352 Blocks
Space in use: 1.2 GB = 300959 Blocks
Free Space: 3.8 GB = 919393 Blocks
Block size: 4096 Byte
Elapsed: 00:00:02 Remaining: 00:00:07 Rate: 7.81GB/min
Current Block: 149956 Total Block: 1220352
Data Block Process:
21.12%
Total Block Process:
12.29%

- Press ***ENTER*** key to continue
- Choose between:
  - ***(3) Start over*** to repeat the procedure and recover another disk
  - ***(0) Power off*** to exit Clonezilla
    - ***Wait*** until the shutdown process is done (black screen)
    - Turn ***OFF*** the system using the main switch
    - ***Remove the USB recovery disk*** from the USB port in the rack frontal panel
    - Turn ***ON*** the system using the main switch

3.1.1.6 Customize the system

NOTE:
All the images used to restore disks are generic and must be customized with the correct configuration and license files.

- An ***error message*** about Lighter user database could appears at system restart:

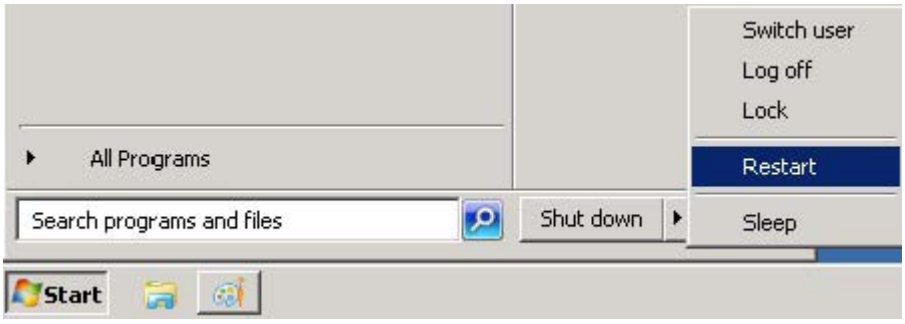
- Press ***ENTER*** key to continue
- Recreate the Lighter user database ***double click on*** file `C:\user_db.bat`

OS (C:)
File Edit View Favorites Tools Help
Back Search Folders
Address C:\
Name Size Type Date Modified
WERUNTIME.INI 1 KB Configuration Settings 1/14/2013 2:57 PM
user_db.bat 1 KB MS-DOS Batch File 1/1/2010 2:19 AM
TeamViewer DLA.exe 3,807 KB Application 1/21/2013 3:33 PM

- If ***disk D:*** has been restored (SSD which contain the Lighter DATA folder), ***replace the generic*** `license.dat` and `laser.inz` files in D:\DATA\CONFIG ***with the custom ones*** present into the folder ***Fileinz and report*** in the ***USB recovery disk***

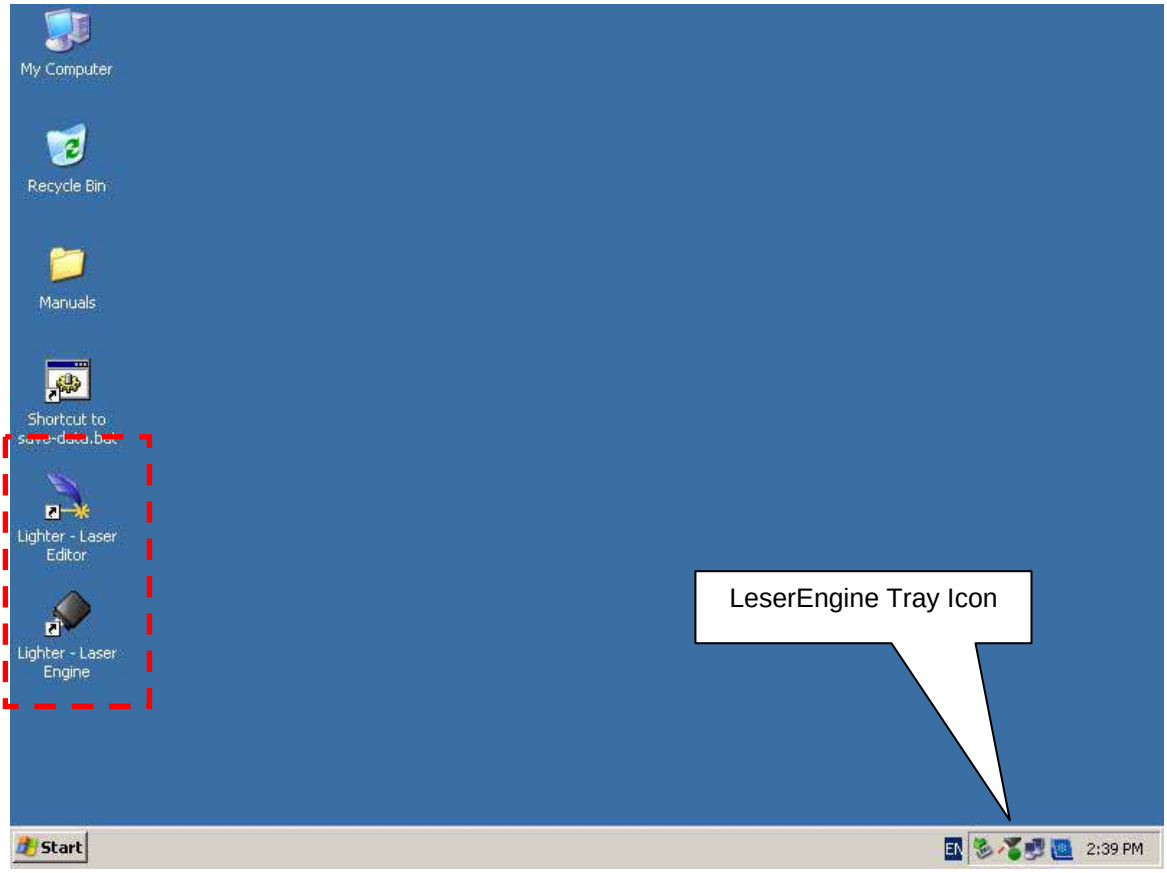
- Double click on Shortcut to ***save-data.bat*** icon in the Desktop

- ***Restart*** Windows <u>without turning OFF the system</u>



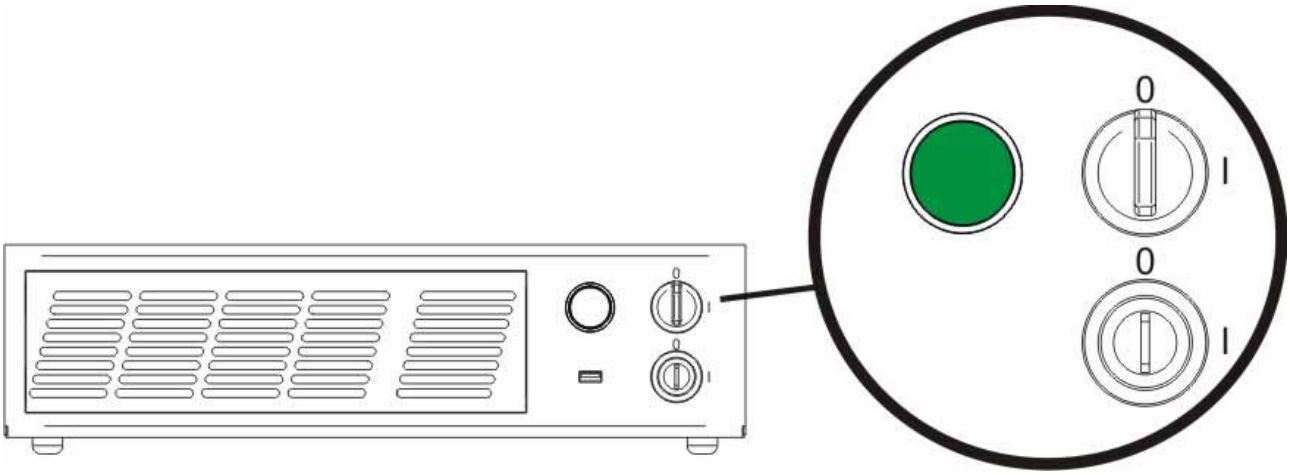
3.1.1.7 Starting operating in Local Control mode

Connecting monitor, mouse & keyboard to the laser system (paragraph 2.7.14) allows the operator to access the console witch contains the instruments to operate with laser.



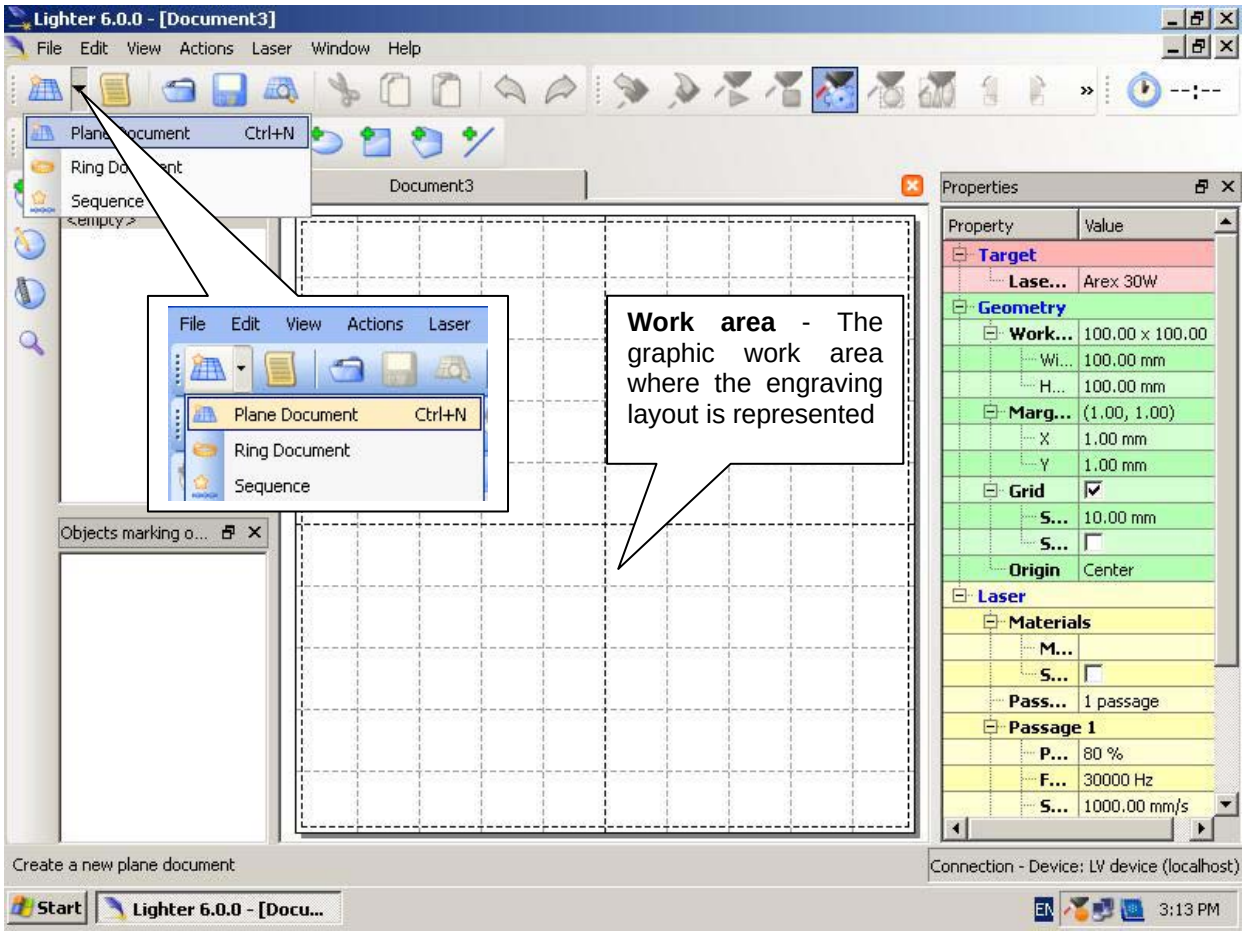
	Laser Editor is a software that allows to easily mark or engrave product identification information such as 2D matrix codes, barcodes, text, alpha-numeric serial numbers, date codes, part numbers, graphics and logos in any production environment. With Laser Editor you can: o edit graphic layouts o set laser parameters o set system configuration o control the integrated I/O module for axis management o create automated procedures o create programs using Lighter programming language
	Laser Engine is an application automatically loaded at start-up that allows to operate on the marking system. Laser Engine is present in the tray icon. With Laser Engine you can: o watch the system status o select a saved document, display limits using a red laser pointer, watch the marking preview and do marking tests o switch between Manual/Auto mode (engraving operations controlled by operator or external signals)

How to create and edit your first graphic document

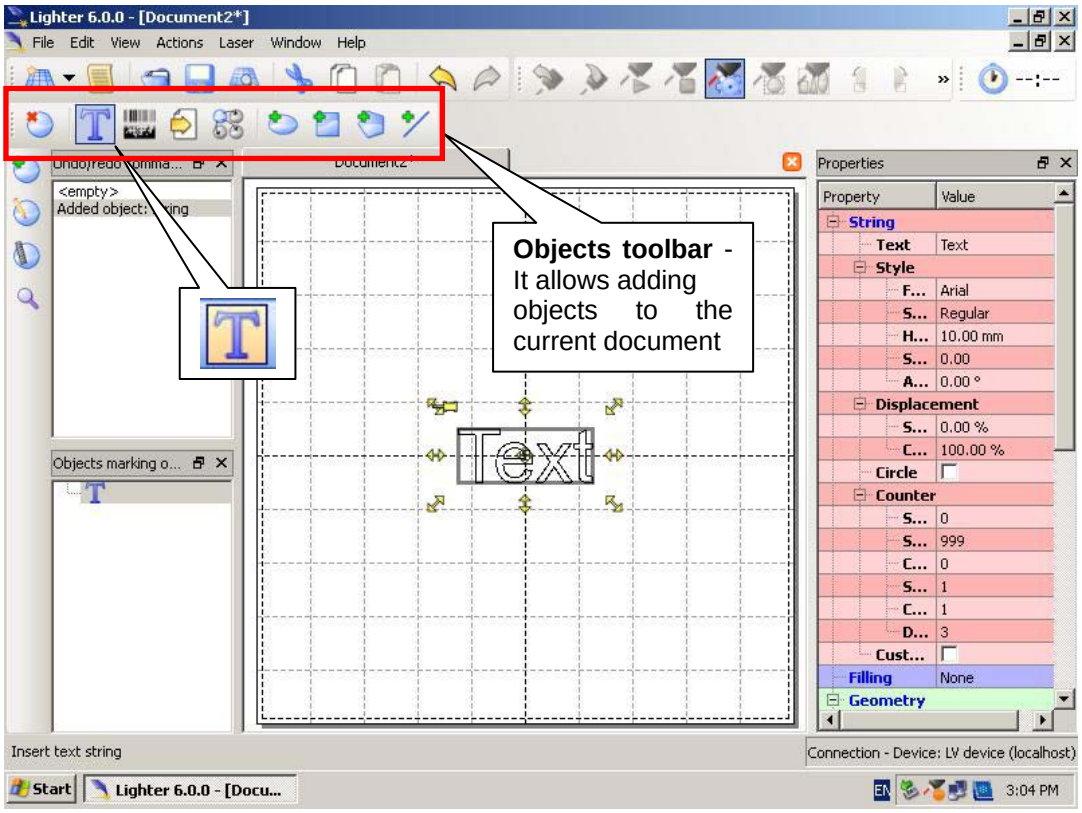


Double click on LaserEditor icon to start the layout editor application

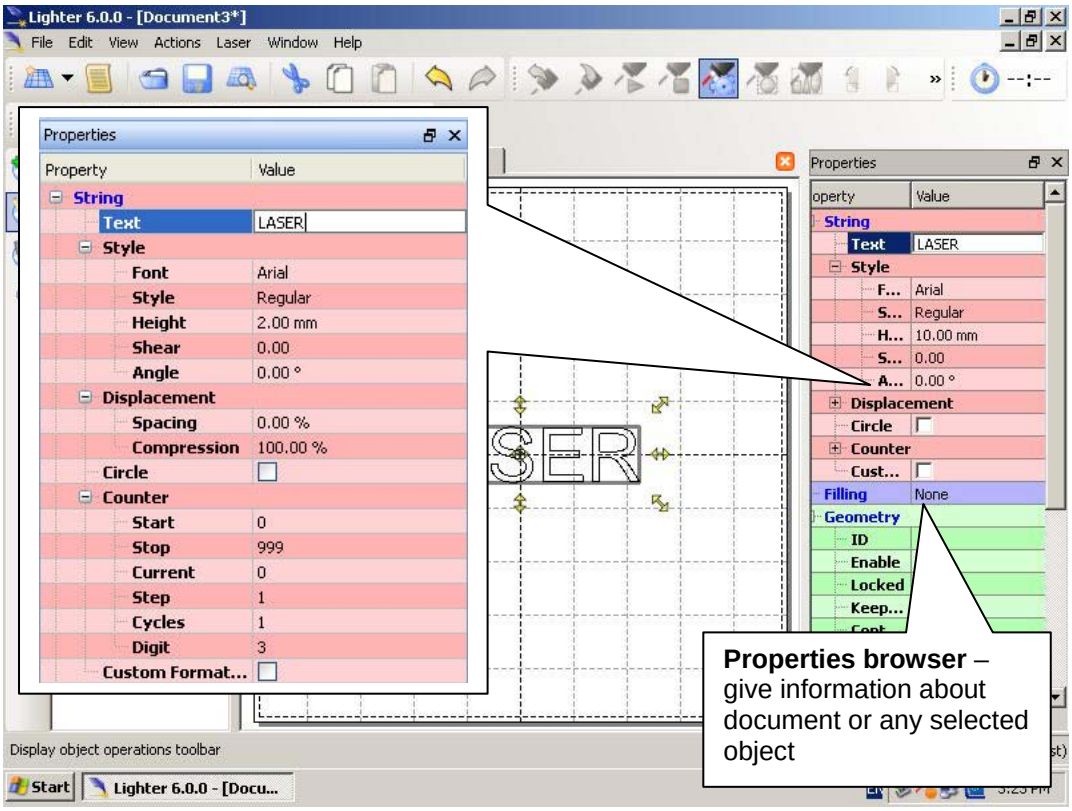
Click on the document type selector and choose *Plane Document:*



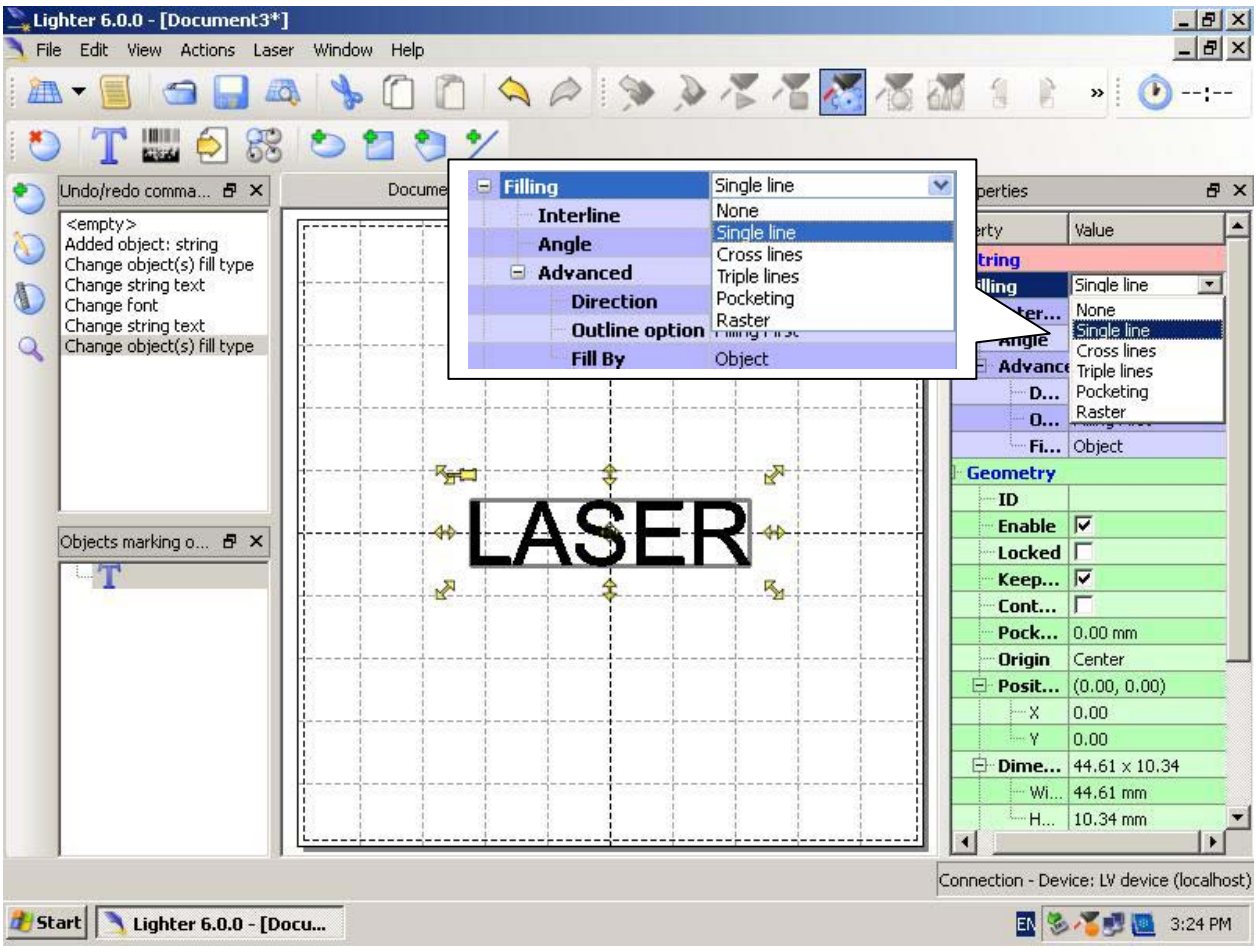
Click on the *Text String* icon in the Object toolbar to add a string object to the plane:



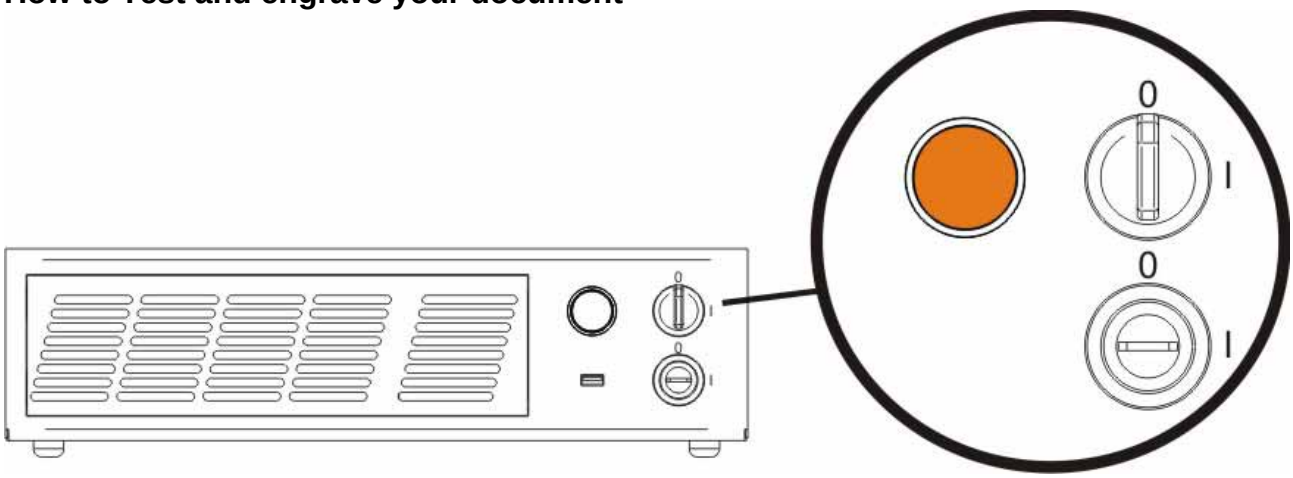
Edit String property like value, font, style, etc using the *Properties browser*:



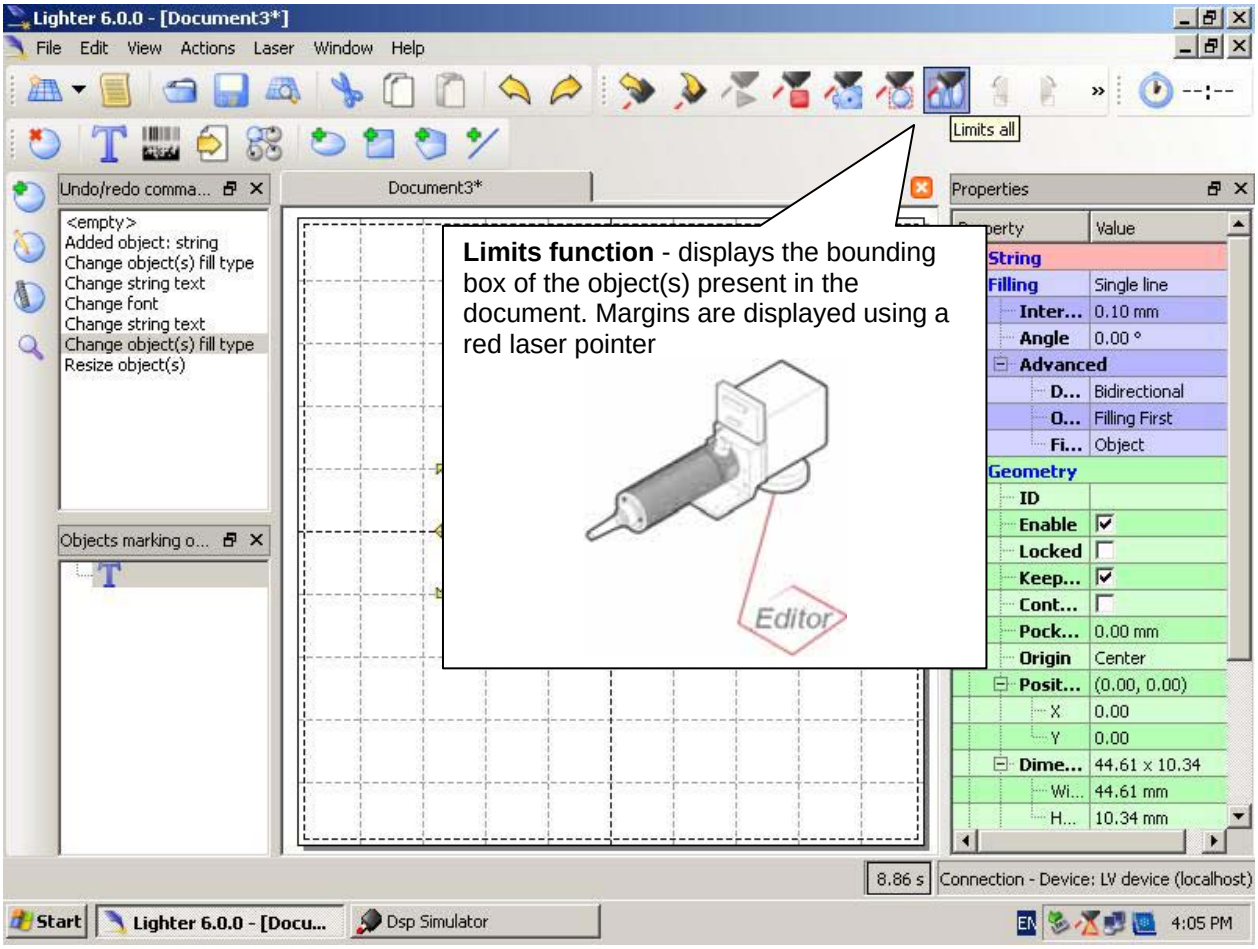
Edit Filling property like filling type, interline, etc using the *Properties browser*:



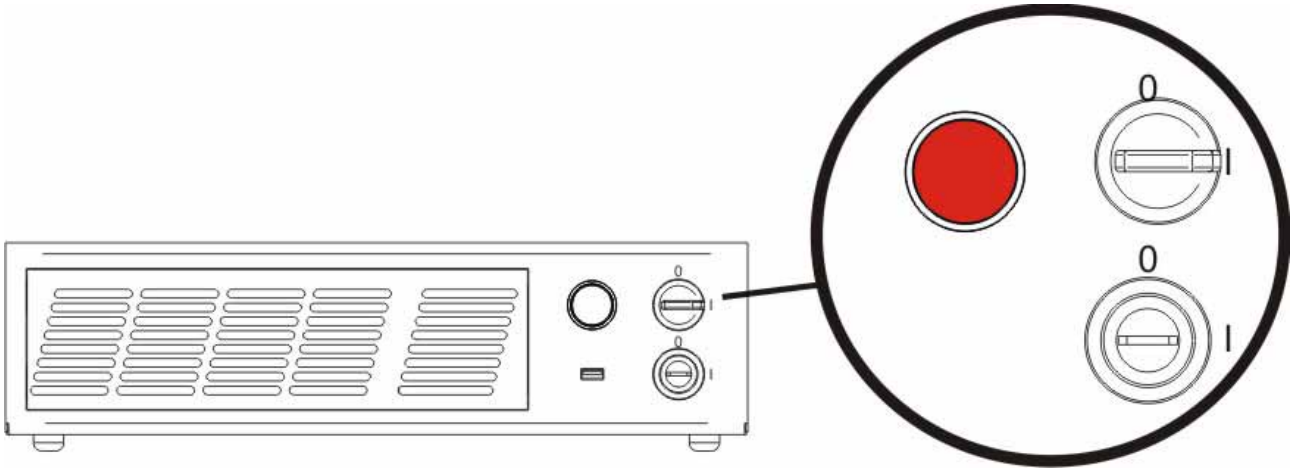
How to Test and engrave your document



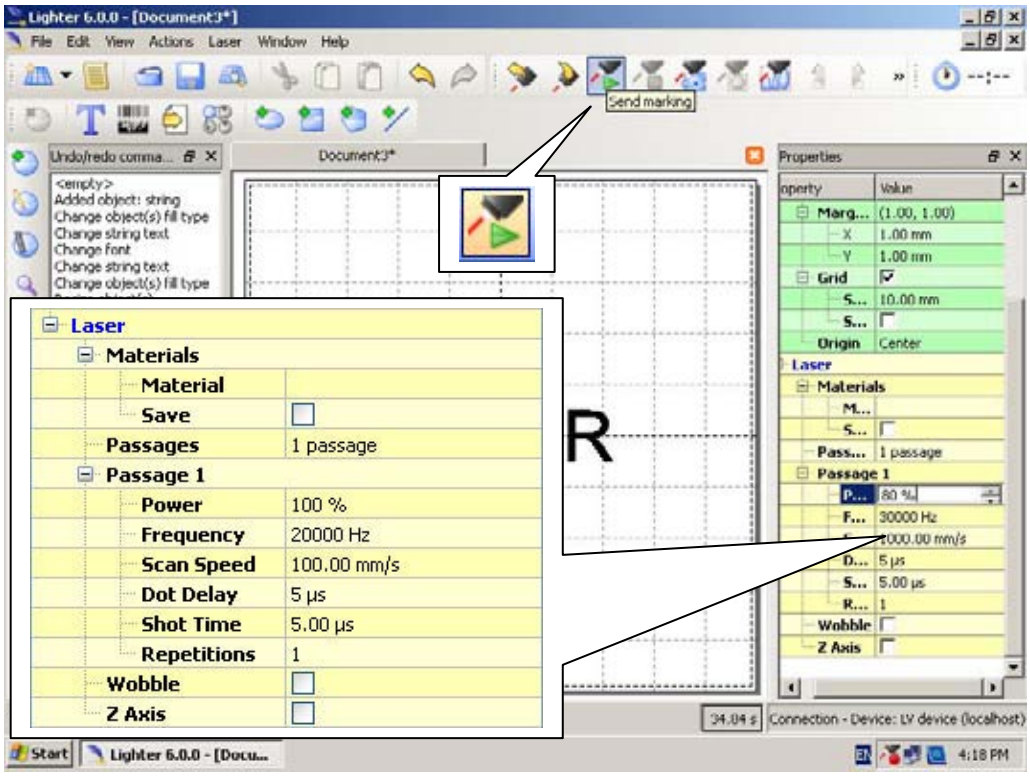
Press *Limits All* button in the *Laser Toolbar* to adjust the object position in the marking field:



Adjust the Laser parameters using the *Properties browser*



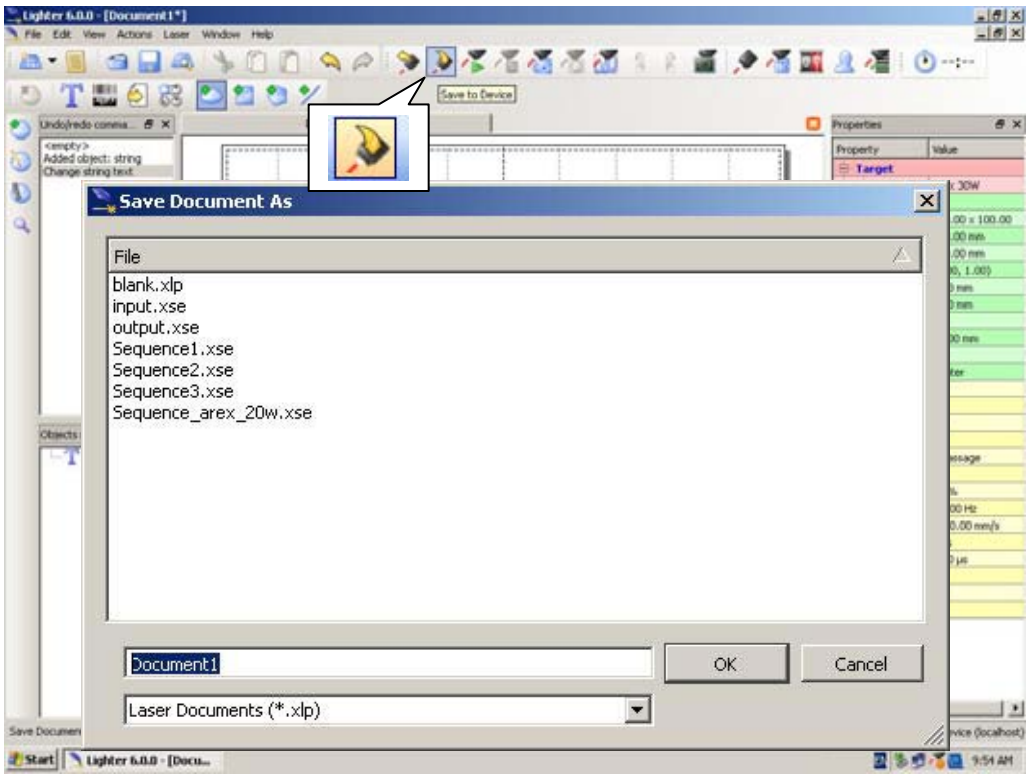
Press *Send Marking* button in the *Laser Toolbar* to start the engraving process:



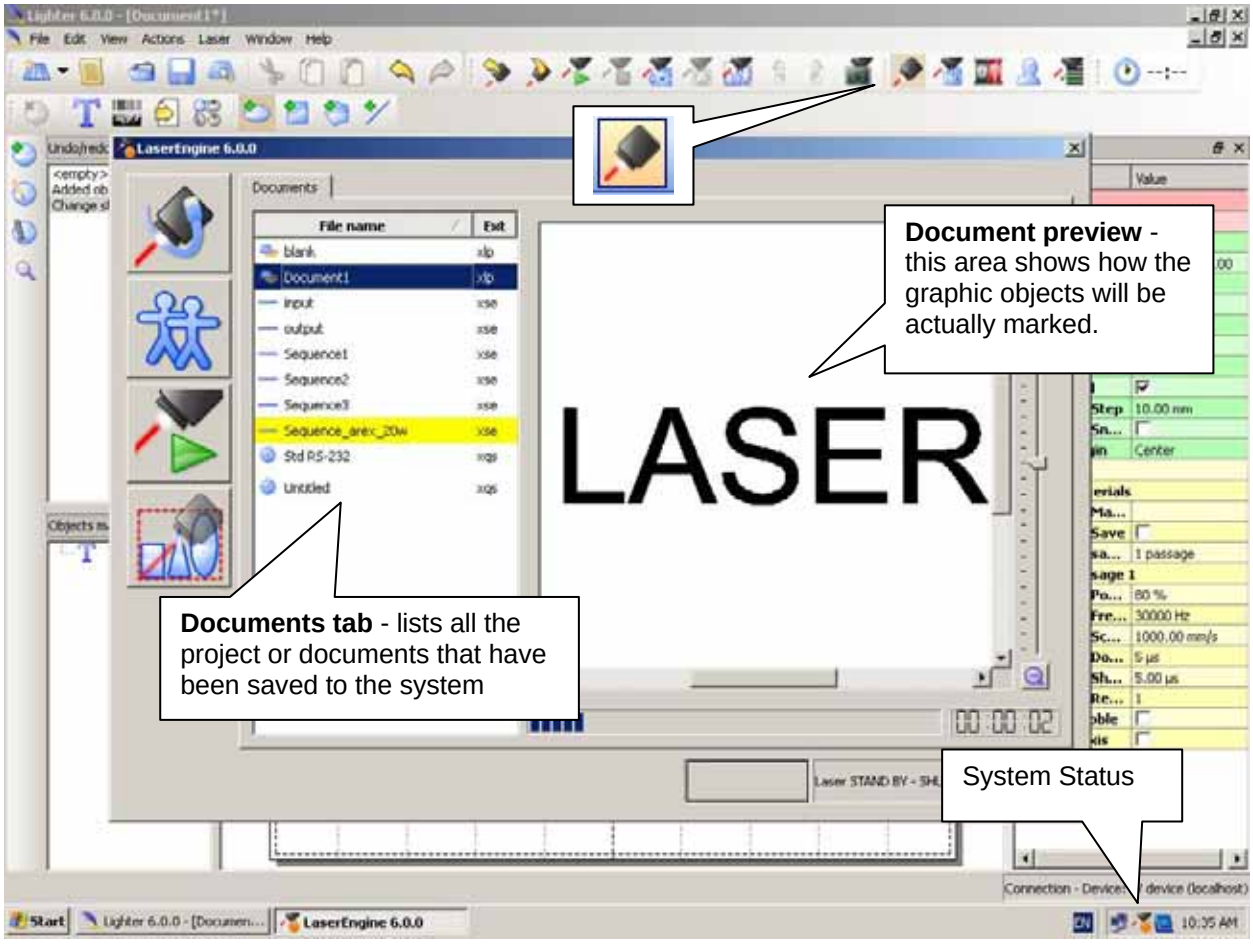
How to use external signals to engrave your document

Automate the marking process means that documents are marked using external START & STOP signals, that can be generated by PLC or other external devices.

Click on *Save to Device* button to save the layout in the device memory:



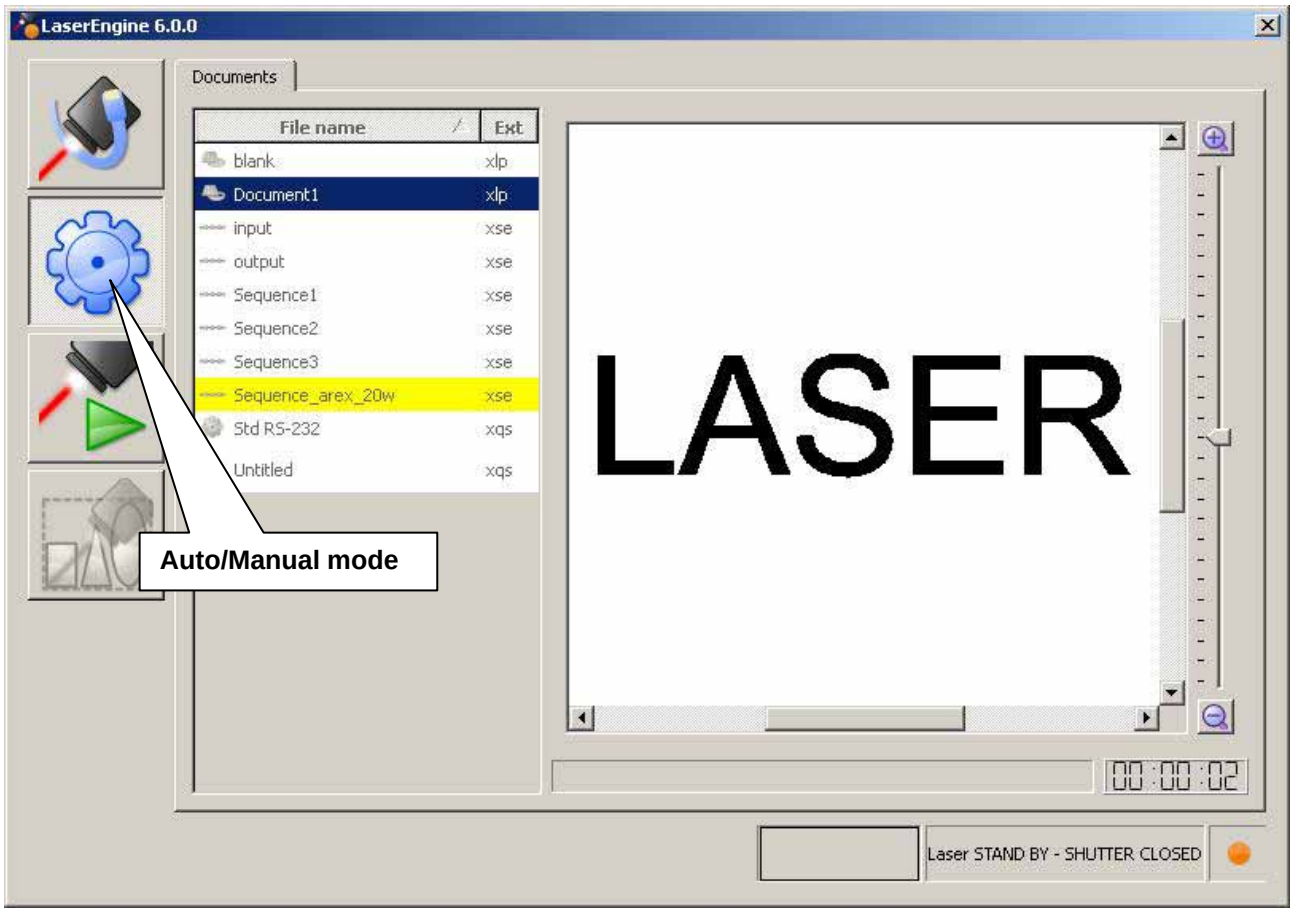
Click on *Show LaserEngine* button to display LaserEngine window:


Document preview - this area shows how the graphic objects will be actually marked.
Documents tab - lists all the project or documents that have been saved to the system
System Status
LASER

AUTO/MANUAL Mode button allows switching between the two available working modes:

- Auto mode: the engraving operations are executed automatically using external signals.
- Manual mode: used for displaying the margins of the graphic objects to be marked and testing layouts.

Select the document from the list and click on *To Auto Mode* button:



The laser system is ready to mark document using external START & STOP signals:

4 : TECHNICAL SPECIFICATION

4.1 EXTERNAL CONNECTORS SPECIFICATIONS

4.1.1 INTERLOCK IN

Interlock **disable** the Class4 laser source inside the marking system. Interlock internal circuit is designed to comply with the single fault condition.

PIN	SIGNAL	TYPE	DESCRIPTION
1	VCC_INT_IN_A	OUTPUT	5V DC reference for interlock IN signal A
2	INT_IN_A	INPUT	Interlock IN signal A
3	GND_INT_B	GND	Ground reference for interlock IN signal B
4	INT_IN_B	INPUT	Interlock IN signal B

Table: Interlock plug Pin-out.

NOTE:
The 4 positions **interlock connector** implements the **double and redundancy safety interlock** (EN60825 compliant). See figure 78.

NOTE:
To restore the marking system is necessary repeat the "*Turning on sequence*" without shutting down the system. See Chapter 3.1 for more details.

PANEL CONNECTOR
Type SWITCHCRAFT TB Series male Tini Q-G (Mini XLR) panel mount connector, 4 positions.

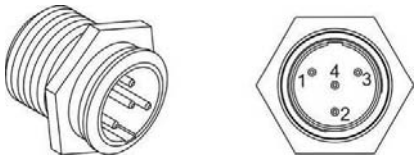


Figure 66: Male panel plug cod. TB4M (front view).

PLUG CONNECTOR
Connector type SWITCHCRAFT TA Series Tini Q-G (Mini XLR) female cable mount connectors, 4 positions.

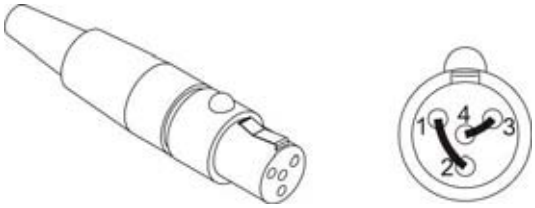


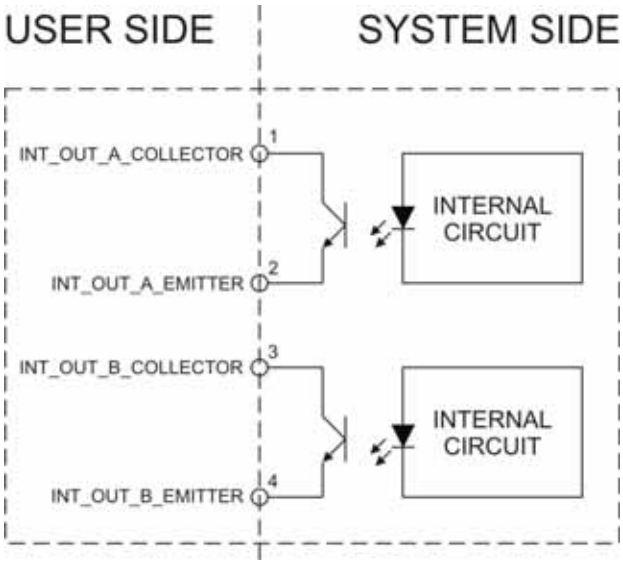
Figure 67: Female cable mount connector cod. TY4F (solder view).

4.1.2 INTERLOCK OUT

The interlock-out allows to monitoring of the operation of the interlock connector.

PIN	SIGNAL	TYPE	DESCRIPTION
1	INT_OUT_A_COLLECTOR	COLLECTOR	Interlock OUT signal A
2	INT_OUT_A_EMITTER	EMITTER	
3	INT_OUT_B_COLLECTOR	COLLECTOR	Interlock OUT signal B
4	INT_OUT_B_EMITTER	EMITTER	

Tabella: Pin-out Interlock OUT panel socket.



INT_OUT_A	INT_OUT_B	STATUS
Closed	Closed	Normal Operation
Closed	Open	Interlock Fault
Open	Closed	Interlock Fault
Open	Open	Interlock Fault

Type	NPN BJT transistor
V_{max}	300 V
I_{max}	60 mA
Vsaturation	< 1,5 V
Leakage current	< 400 nA

PANEL CONNECTOR

Panel socket BINDER, 4 positions female, 719 series.

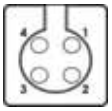


Figure 68: Female panel socket cod. 09-9766-30-04 (front view).

PLUG CONNECTOR

Binder male cable mount connectors, 719 series, 4 positions.

Figure 69: Male cable mount connector cod. 09-9767-00-04 (front view).

4.1.3 ENCODER CONNECTOR

Panel socket BINDER, M12, 8 positions female, 763 series. Recommended encoder: Datalogic ENC58-S10-XXXX-M1 (ENC58-S10-5000-M12).

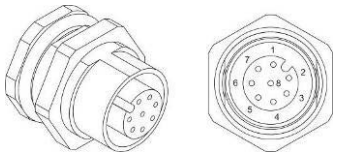


Figure 70: Female panel socket cod. 09-3482-87-08 (front view).

PIN	SIGNAL	TYPE	DESCRIPTION
1	GND	GND	Ground signal
2	VCC	POWER OUTPUT	12V DC power supply
3	ENC_A	DIGITAL INPUT	Encoder HTL A channel signal
4	GND	GND	Return signal for ENC_A
5	ENC_B	DIGITAL INPUT	Encoder HTL B channel signal
6	GND	GND	Return signal for ENC_B
7	NC	NC	NC
8	NC	NC	NC
BODY	SHIELD	SHIELD	SHIELD

4.1.4 PHOTOCELL CONNECTOR

Panel socket BINDER, M12, 4 positions female, 763 series. Recommended photocell: Datalogic S51-PA-5-B01-PK; Datalogic S15-PA-5-B01-PK or equivalent.

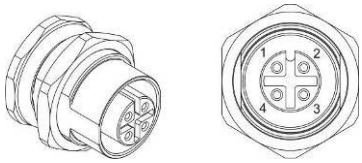


Figure 71: Female panel socket cod. 09-3482-87-04 (front view).

PIN	SIGNAL	TYPE	DESCRIPTION
1	VCC	POWER OUTPUT	12V DC power supply
2	NC	NC	NC
3	GND	GND	Ground signal
4	PHOTOCELL	DIGITAL INPUT	PNP photocell signal

NOTE:
For EMC compliance a RICHCO RRC-16-9-28-M2-K5B (or equivalent) must be used.

4.1.5 COMMAND BOX CONNECTOR – PANEL SOCKET

Panel socket SUB-D, 25 positions, female.

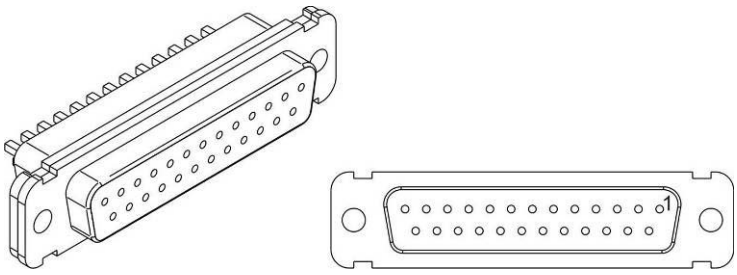


Figure 72: Female panel socket SUB-D 25 (frontal view).

PIN	SIGNAL	TYPE (***)	DESCRIPTION
1	EXT_12V	Output power supply	Auxiliary 12Vdc power supply available for drive input logical HIGH (max 250mA)
2	EXT_ENABLE_B	Digital Input	Secondary external enable signal (see paragraph 4.1.11) - HIGH level: contact closed - LOW level or disconnected: contact opened
3	RESERVED	Digital Output	DO NOT CONNECT
4	EXT_12V	Output power supply	Auxiliary 12Vdc power supply available for drive input logical HIGH (max 250mA)
5	EXT_12V	Output power supply	Auxiliary 12Vdc power supply available for drive input logical HIGH (max 250mA)
6	EXT_12V	Output power supply	Auxiliary 12Vdc power supply available for drive input logical HIGH (max 250mA)
7	EXT_12V	Output power supply	Auxiliary 12Vdc power supply available for drive input logical HIGH (max 250mA)
8	EXT_ENABLE_A	Digital Input	Primary external enable signal (see paragraph 4.1.11) - HIGH level: contact closed; - LOW level or disconnected: contact opened
9	BUSY (*)	Digital Output	This signal is used to know if the current spooler is executing (marking in progress) (see paragraph 4.1.11) - ON during marking process
10	CONNECTOR PRESENCE	Digital Input	This signal is used to check the presence of the command box connector (see paragraph 4.1.12) - HIGH level: normal operation; - LOW level or disconnected: laser source faulty
11	START MARKING (*)	Digital Input	This signal is used to start to the marking process when a document or a sequence is running in AUTO MODE (**) or WORK MODE (**): (see paragraph 4.1.11.3) - HIGH level pulsed signal start the marking process
12	EXT_KEY	Digital Input	External key signal (see paragraph 4.1.11) - HIGH level: contact closed; - LOW level or disconnected: contact opened
13	STOP MARKING (*)	Digital Input	This signal is used to stop the marking process (see paragraph 4.1.11.3) - HIGH level pulsed signal start the marking process

14	RESERVED	Digital Input	DO NOT CONNECT
15	RESERVED	Digital Input	DO NOT CONNECT
16	RESERVED	Digital Input	DO NOT CONNECT
17	END	Digital Output	This signal is used to know if the marking process is finished (see paragraph 4.1.11.3): - ON at the end of marking process
18	POWER_ON	Digital Output	This signal is used to know if the system is already warmed up: (see paragraph 4.1.11) - ON when the laser is in STAND_BY or READY state
19	GND	Ground	Ground reference
20	SYSTEM_ALARM	Digital Output	This signal is used to know if the system is in booting up state or in error state: (see paragraph 4.1.11) - ON during BOOTING UP - ON in case of system error
21	GND	Ground	Ground reference
22	ENABLE_OUT	Digital Output	This signal is used to know if the system is ready to emit laser radiation: (see paragraph 4.1.11) - ON when the system is in READY state
23	SW_READY (*)	D igital Output	This signal is used to know if a document, sequence or script is loaded and ready to be executed: - ON when a document or a sequence is running in AUTO MODE (**) or WORK MODE (**) (SW_READY COMPATIBILITY (**) = true) - ON when a document or a sequence is running in AUTO MODE (**) and laser in READY state (SW_READY COMPATIBILITY (**) = false) - ON when a script is running n AUTO MODE (**) and “IoPort.setReady (true)” function is used
24	GND	Ground	Ground reference
25	GND	Ground	Ground reference

(*) refers to Lighter user’s manual “Setting I/O parameters” paragraph to set the signal properties

(**) refers to Lighter user’s manual

(***) refer to paragraph 4.1.10

NOTE: Connection example in paragraph 4.1.12

4.1.6 AXES CONNECTOR (I/O CONTROL)

Panel socket SUB-D, 25 positions, male.

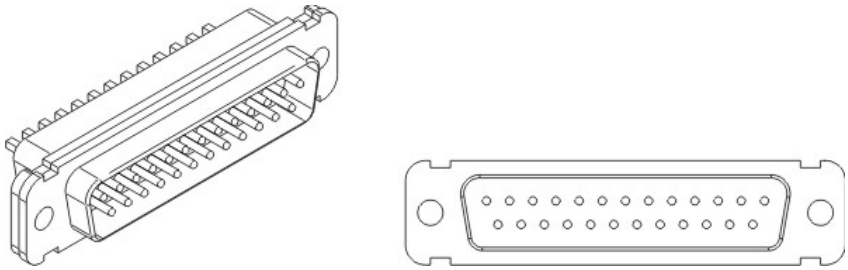


Figure 73: Male panel socket SUB-D 25 (frontal view).

PIN	SIGNAL	TYPE (**)	DESCRIPTION
1	EXT_12V	Output Power supply	Auxiliary 12Vdc power supply available for drive input logical HIGH (max 250mA)
2	OUTPUT_0 (*) or STEP_Y	Digital Output	Generic output or Y-Axis drive step signal (Clock) for axis control
3	OUTPUT_2 (*) or STEP_Z	Digital Output	Generic output or Z-Axis drive step signal (Clock) for axis control
4	OUTPUT_4 (*) or BRAKE X	Digital Output	Generic output or X-Axis electromechanical brake release signal. ON during drive motion
5	OUTPUT_6 (*) or BRAKE Y	Digital Output	Generic output or Y-Axis electromechanical brake release signal. ON during drive motion
6	OUTPUT_8 (*) or BRAKE Z	Digital Output	Generic output or Z-Axis electromechanical brake release signal. ON during drive motion
7	INPUT_0 (*) or ZERO X	Digital Input	Generic input or X-Axis home sensor input. The home search is stopped when this signal goes HIGH
8	INPUT_1 (*) or ZERO Y	Digital Input	Generic input or Y-Axis home sensor input. The home search is stopped when this signal goes HIGH
9	INPUT_2 (*) or ZERO Z	Digital Input	Generic input or Z-Axis home sensor input. The home search is stopped when this signal goes HIGH
10	INPUT_3 (*) or DISABLE X	Digital Input	Generic input or X-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation
11	INPUT_4 (*) or DISABLE Y	Digital Input	Generic input or Y-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation
12	INPUT_5 (*) or DISABLE Z	Digital Input	Generic input or Z-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation
13	GND	Ground	Ground reference
14	OUTPUT_12 (*) or STEP R	Digital Output	Generic output or R-Axis drive step signal (Clock) for axis control
15	OUTPUT_1 (*) or STEP X	Digital Output	Generic output or X-Axis drive step signal (Clock) for axis control
16	OUTPUT_3 (*) or DIR Z	Digital Output	Generic output or Z-Axis drive direction signal
17	OUTPUT_5 (*) or DIR Y	Digital Output	Generic output or Y-Axis drive direction signal
18	OUTPUT_7 (*) or DIR X	Digital Output	Generic output or X-Axis drive direction signal

19	INPUT 9	Digital Input	Generic Input
20	INPUT 8	Digital Input	Generic Input
21	INPUT_7 (*) or ZERO R	Digital Input	Generic input or R-Axis home sensor input. The home search is stopped when this signal goes HIGH
22	INPUT_6 (*) or DISABLE R	Digital Input	Generic input or R-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation
23	OUTPUT_9 (*) or BRAKE R	Digital Output	Generic output or R-Axis electromechanical brake release signal. ON during drive motion
24	OUTPUT_11 (*) or DIR R	Digital Output	Generic output or R-Axis drive direction signal
25	GND	Ground	Ground reference

(*) enable an axis cause that the corresponding signals will no longer be available as generic inputs/output. Refers to Lighter user's manual, "Setting the X, Y, Z, and Rotor Axes parameters" to enable/disable Axes and set the Axes properties.

(**) vedere paragrafo 4.1.10

4.1.7 RS232 CONNECTOR

Panel socket SUB-D, 9 positions, male.

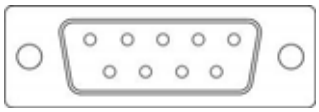
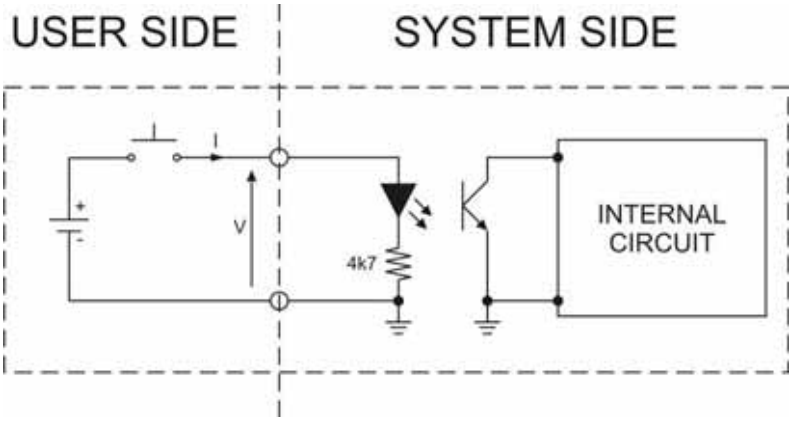


Figure 74: Male panel socket SUB-D 9 (frontal view).

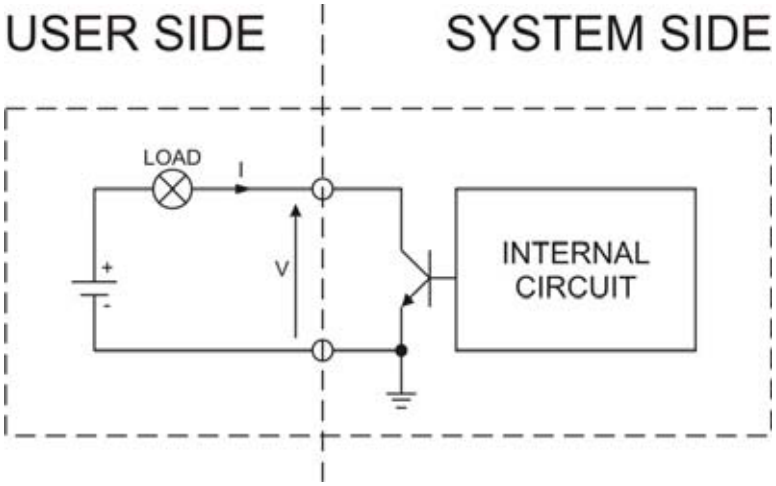
PIN	SIGNAL	TYPE	DESCRIPTION
2	Tx	Output	Transmitted data
3	Rx	Input	Received data
5	Ground	Ground	Ground reference

4.1.8 INPUT/OUTPUT SIGNAL SPECIFICATIONS



DIGITAL INPUT:

Type	Optocoupler		
V_{max}	24Vdc		
I_{max}	5mA @ 24Vdc		
Pulse Width	≥ 1ms (debounce)		
	MIN	**TYP**	**MAX**
INPUT Logic LOW	0.0 Vdc	0.0 Vdc	2.0 Vdc
INPUT Logic HIGH	5.0 Vdc	12.0 Vdc	24.0 Vdc



DIGITAL OUTPUT:

Type	Low side driver
V_{max}	24Vdc
I_{max}	250mA
Vsaturation	<0.5Vdc
Leakage current	< 5µA
OUTPUT State ON	V ≤ 0.5 Vdc; I ≤ 250mA
OUTPUT State OFF	V ≤ 24 Vdc; I ≤ 5µA

4.1.9 COMMAND BOX LASER SIGNALS

4.1.9.1 Timing laser control signals.

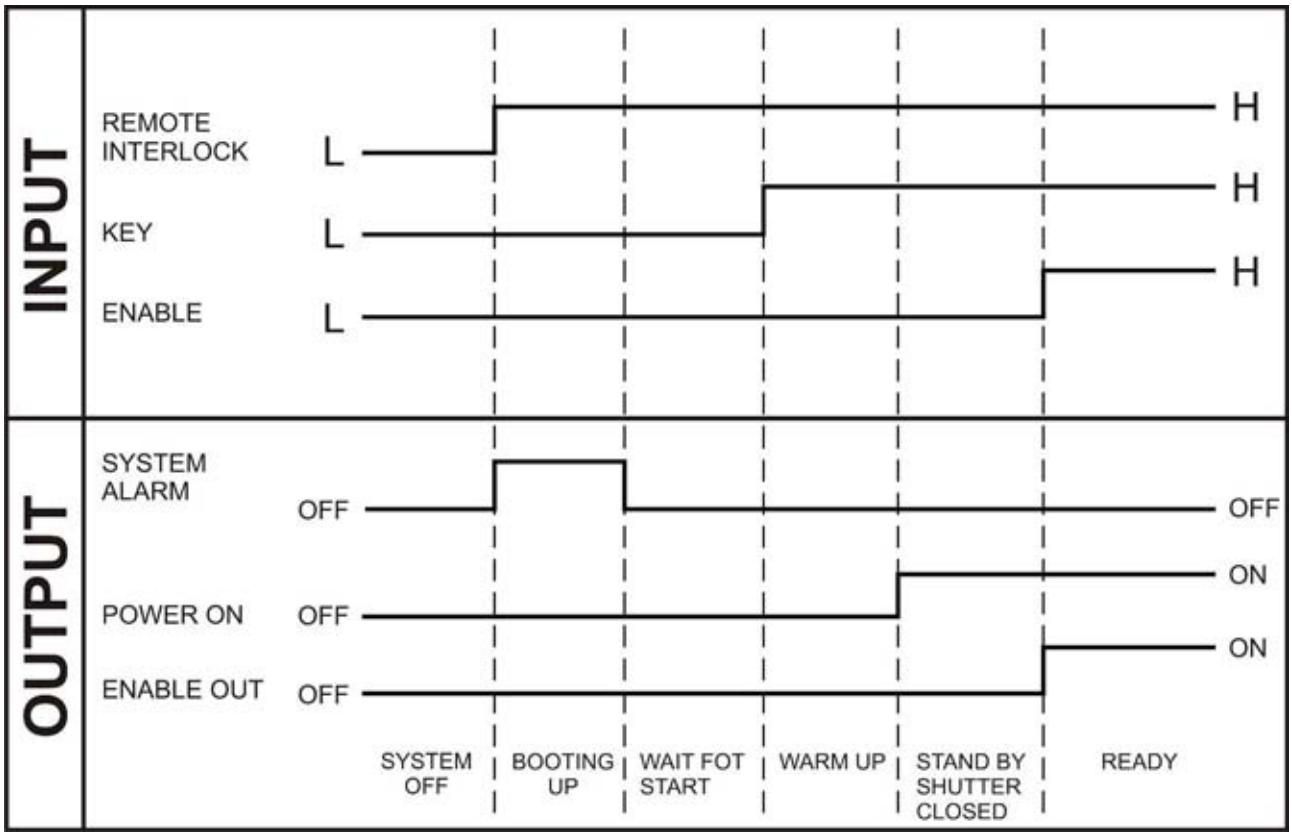


Figura 75: Timing control signals

4.1.9.2 Key and enable signal's scheme

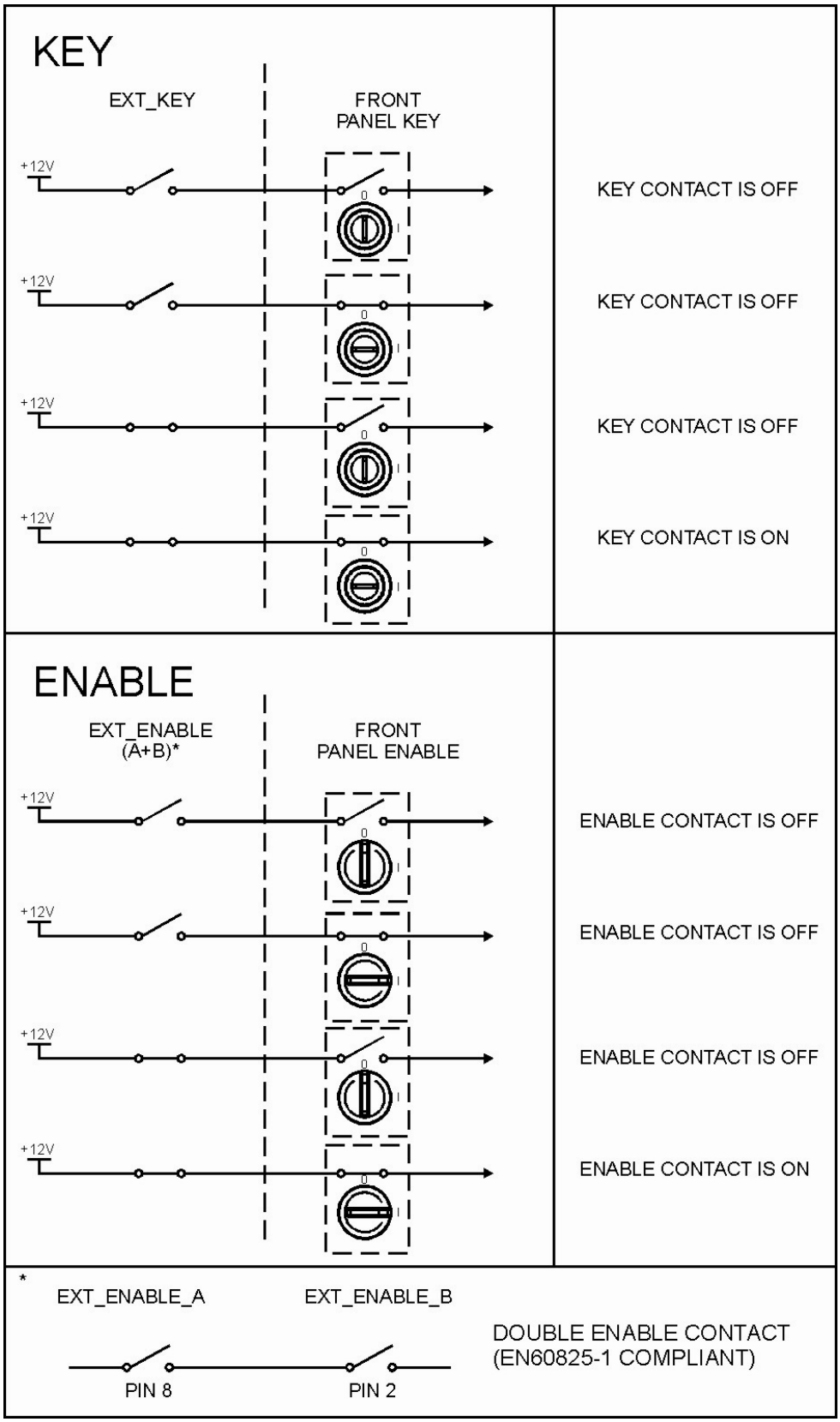


Figure 76: Key and Enable signal's scheme

4.1.9.3 Timing marking process signals

The following diagram illustrates the possible timings and settings of these signals:

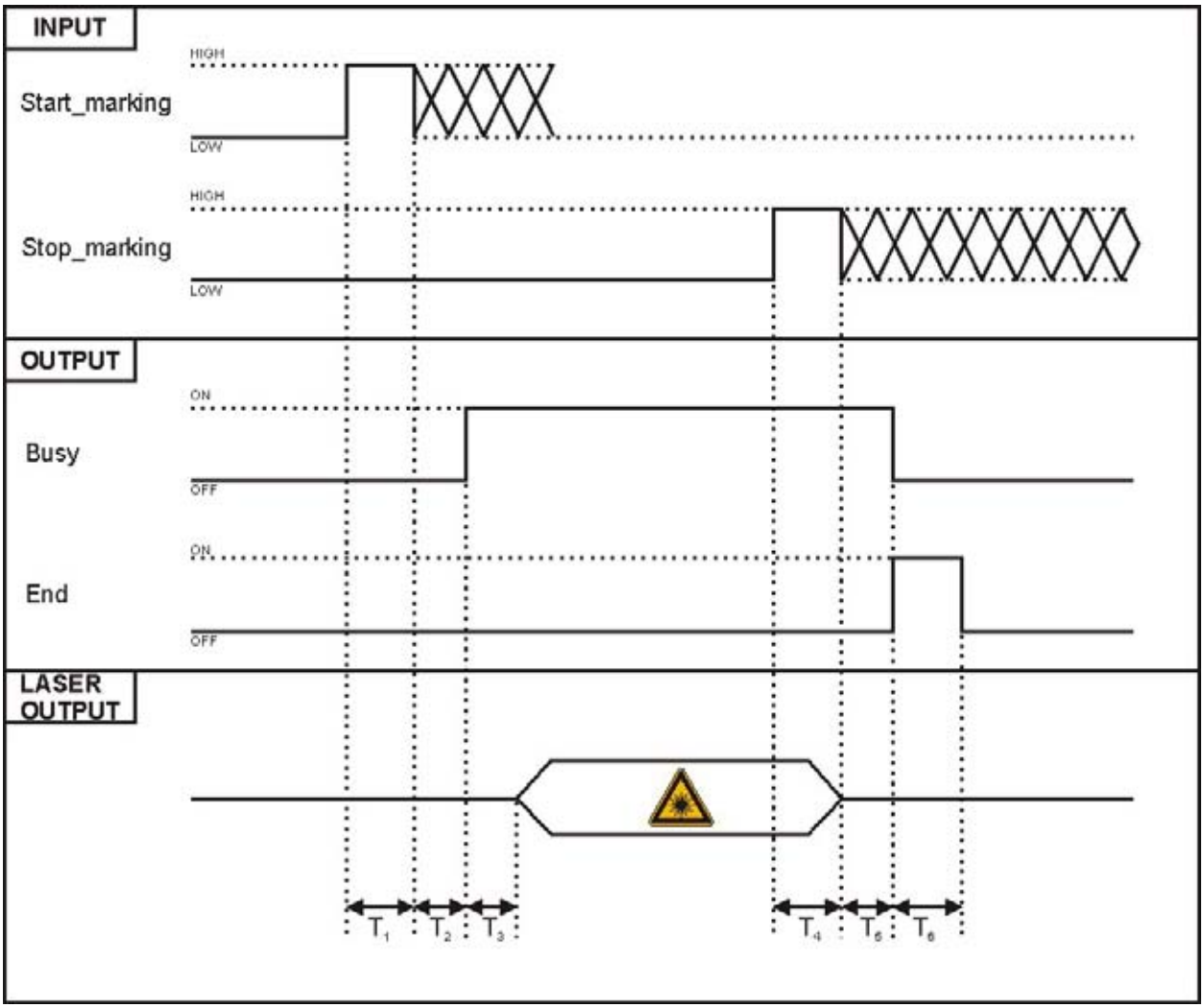


Figure 77: Timing signals

The time intervals in the diagram can all be programmed by a resolution of 1 ms (*).

T_1	Start Time	For setting the minimum acceptable time for the start engraving signal
T_2	Start Delay	For delaying engraving start
T_3	Busy Advance	Busy signal corresponding to mark progress
T_4	Stop Time	The minimum time for stop signal to stop the marking process
T_5	End Delay	For delaying the Laser End signal with respect to laser emission
T_6	End Time	For setting the Laser End activation time

(*) Refer to Lighter user's manual "Setting I/O parameters" to set the signal's properties.

4.1.10 CONNECTION EXAMPLES

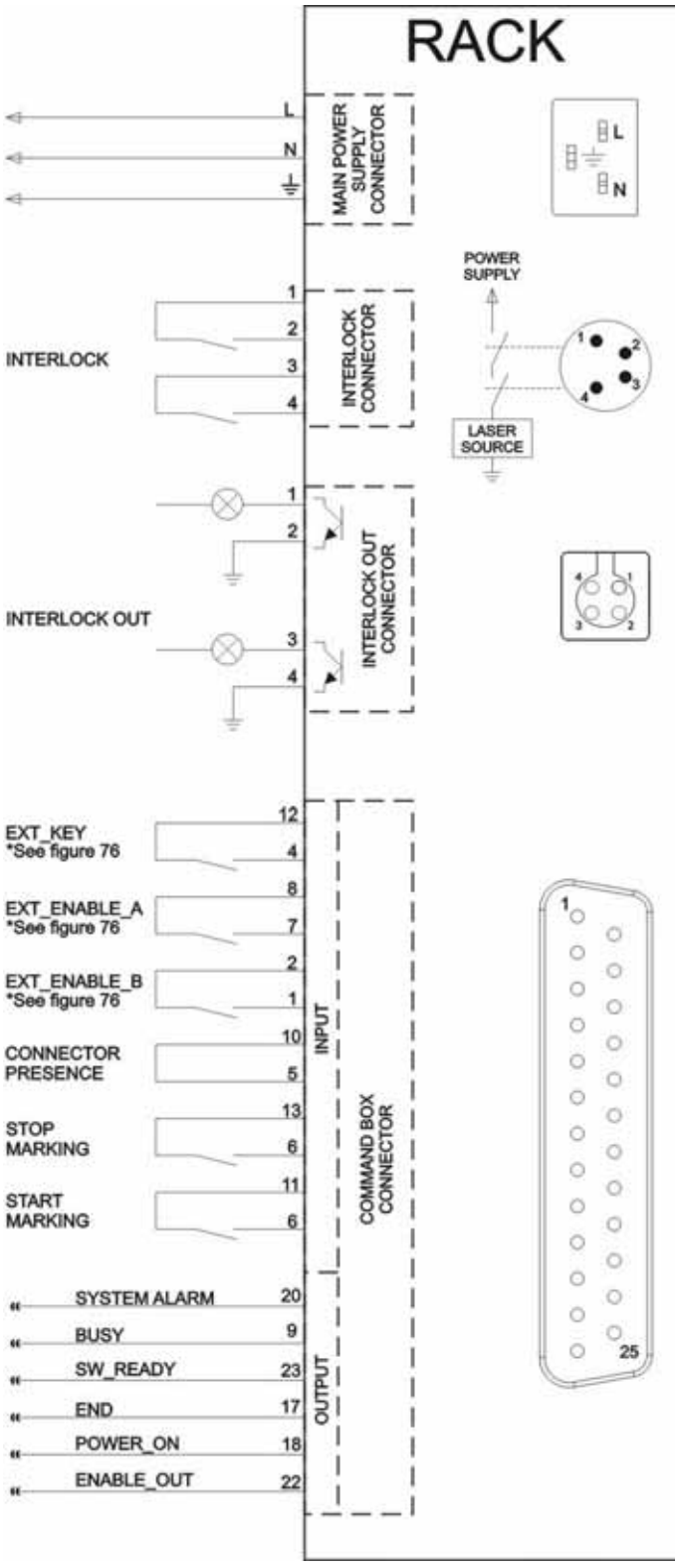


Figure 78: Connection examples.

NOTE:
The 4 positions **interlock connector** implements the **double and redundancy safety interlock** (EN60825 compliant).

EXAMPLE OF APPLICATIONS AND EXTERNAL CONNECTIONS

Handy and simple installation of the marking system allow to make it easy to use also in line production applications.

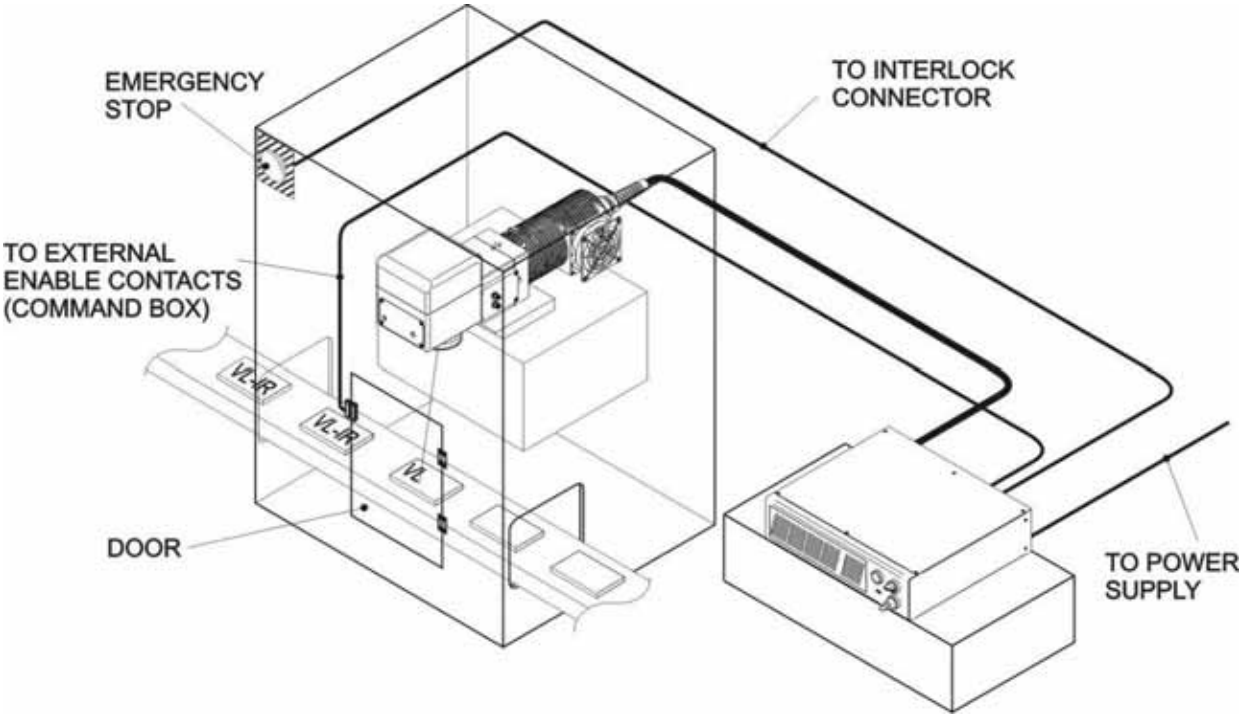


Figure 79: Example of static marking application.

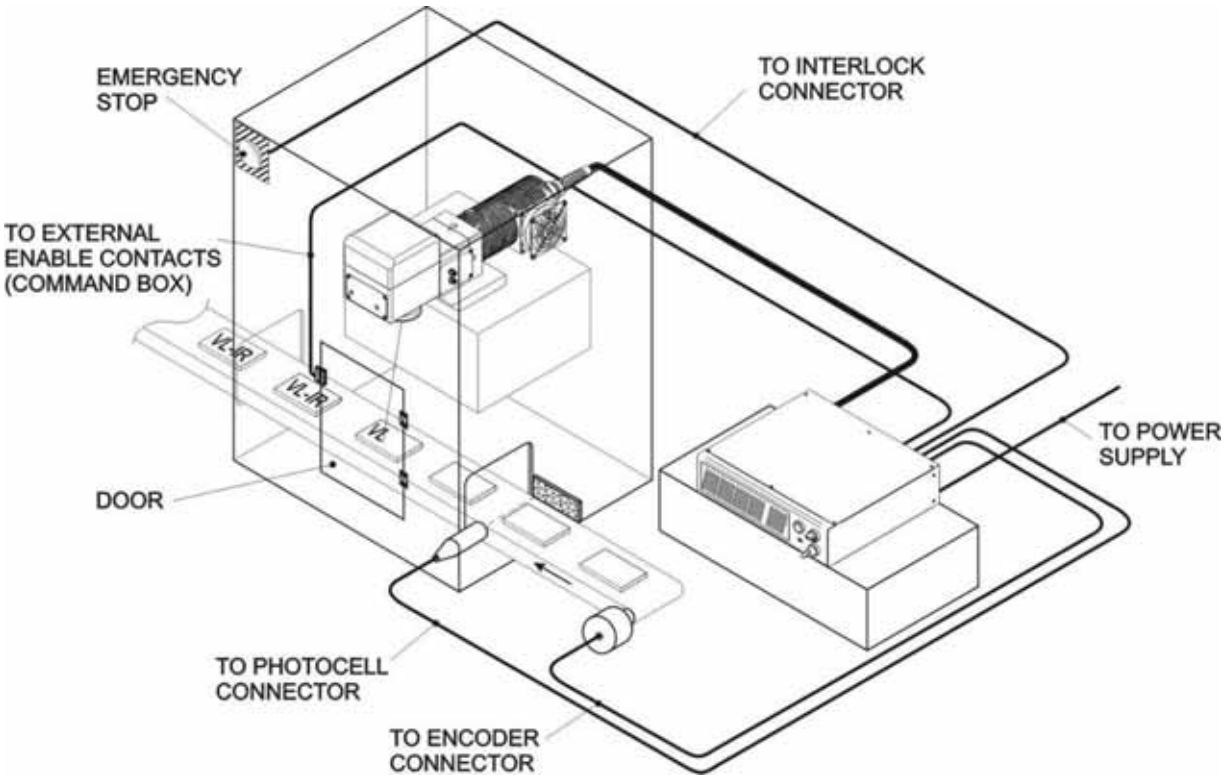


Figure 80: Example of Marking on Fly (MOF) application.

Laser source	Frequency interval	Operation in Continuous Wave (CW)	Q-switch opening time (Shot Time)	Optimal FPK delay
VL-IR 10 W	10 kHz ÷ 200 kHz	SI	1,5 µs (microsecondi)	450µs
VL-IR 15 W	15 kHz ÷ 200 kHz	SI	1,5 µs (microsecondi)	450µs
VL-IR 20 W	20 kHz ÷ 200 kHz	SI	1,5 µs (microsecondi)	450µs

NOTE:

It is strongly recommended **NOT** to change FPK Shot time delay and set, because they have been optimized to ensure the safety of the marking system and the performance marking linked to the high stability of the laser pulses.

4.2 THERMALIZATION AND SUPPRESSION OF GIANT PULSES

Thermalization is useful in order to obtain a good marking quality.

For the purpose of maintaining the Nd:YVO_4 crystal constantly excited (or charged) in order to obtain uniform markings or work processes, the pumping needs to be maintained even when the laser radiation is not being generated. This thermalization operation is carried out by maintaining a suitable current level in the laser diode (and consequently a pumping radiation at 808 nm) with Q-Switch CLOSED so that the laser radiation is neither generated nor emitted.

With the VLase source, this procedure can be implemented using the Software Thermalization.

Software thermalization

Software thermalization is implemented automatically by the Lighter marking software and consists in defining, within the marking project, a certain thermalization level at which the crystal is maintained during the non-emission intervals. It is generally recommended to keep the level of thermalization similar to the power level used for the marking or slightly lower.

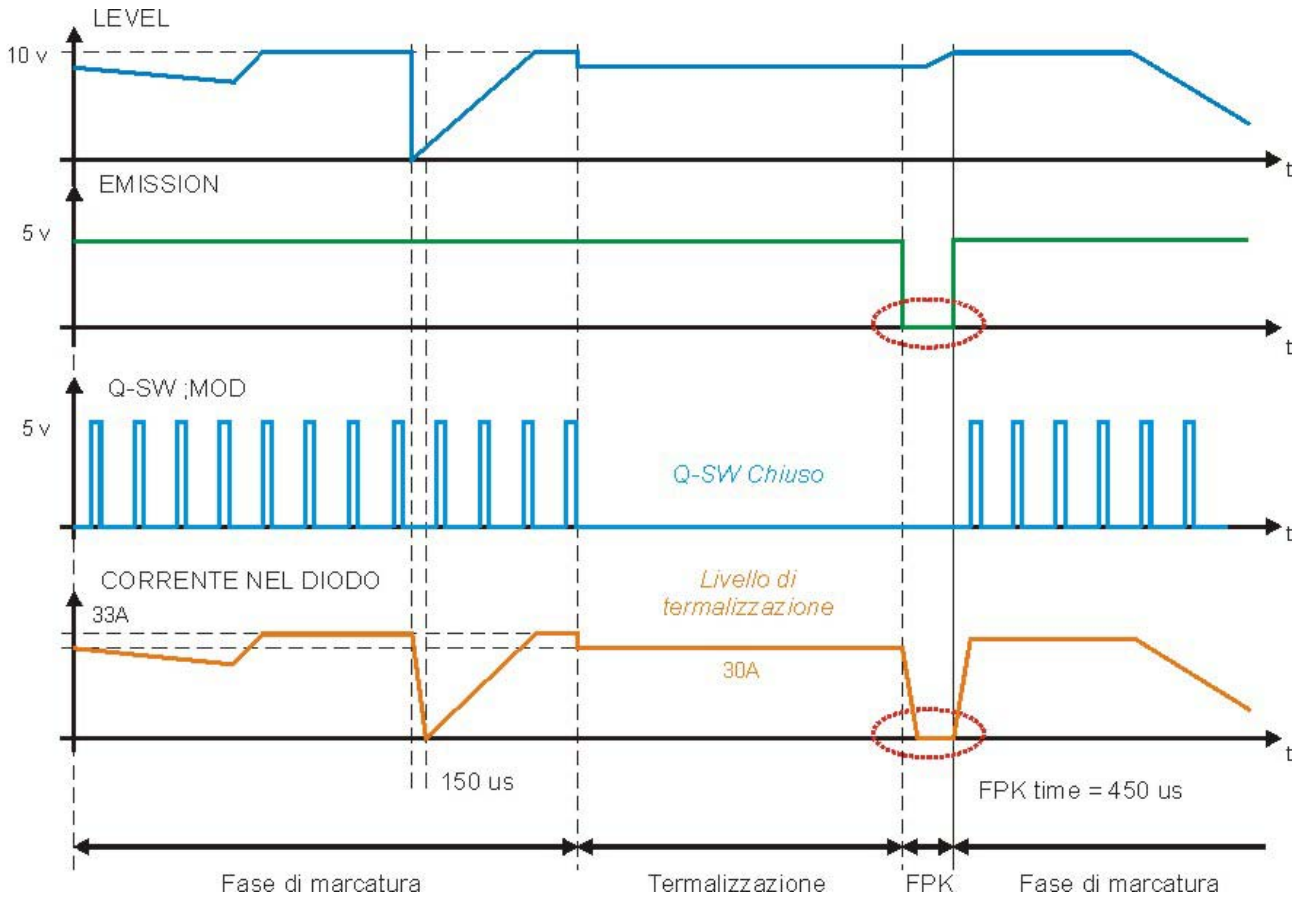


Figura 81: Temporal diagram of Software Thermalization.

As you can see in the graph shown in the Figure, during the marking phase the Q-Switch Modulation signal determines the frequency with which the laser pulses are generated, the effect of the LEVEL signal is a corresponding change in the laser diode current.

Please note that, in order for this to occur, the EMISSION signal has to be active.

NOTE:

Please also note that the current in the laser diode has an up and down time of about 150 microseconds, even if the variation front of the LEVEL signal or of the EMISSION signal were steeper. This limit in the commutation speed of the current in the diode laser is intentional since it is used to protect the laser diode from commutations that are too steep which may damage it or in any case subject it to stress, thus shortening its useful life.

During the thermalization phase, the EMISSION signal stays active, while the LEVEL signal goes into a pre-set thermalization level (i.e. 90%) and the Q SW MOD signal stays fixed at 0 V.

At the end of the thermalization phase, before starting another marking phase, the FPK (First Pulse Killing) procedure needs to be implemented in order to discharge the crystal, thus avoiding the generation of “giant” pulses which may cause marking defects as well as damages to the internal optics of the resonator.

To discharge the crystal, the Q-Switch is kept closed (Q SW MOD signal at 0 V) and the EMISSION signal is brought to a 0V level for at least 450 microseconds, so as to cut off the current in the laser diode and consequently the pumping of the crystal (FPK delay).

According to have the marking system in safety mode (see Appendices for more details) we recommended to install the VLase like figure below in order to limit laser output area. To obtain a good marking quality, and not to decrease life time, we recommended a ventilation or vacuum system in a protection box to limit dust due to marking phase.

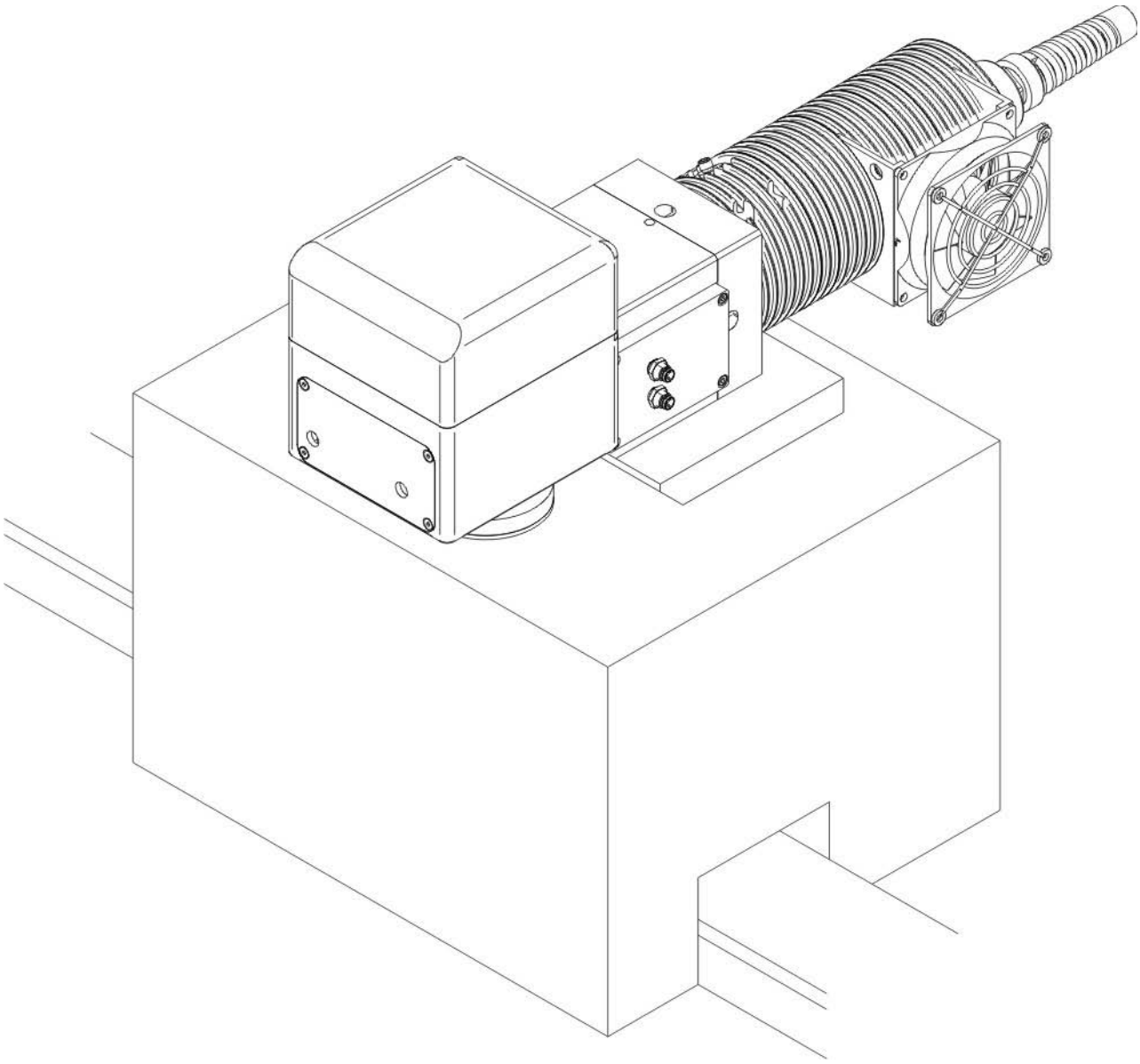


Figure 82: Safety mode example.

4.3 MAINTENANCE

The ordinary maintenance program foresees only. Some operations consist in a mere “check” of the operating condition.

The maintenance activities must be done in respect of law prescriptions regarding the safety rules during the operations.

The following parts/functions have to be controlled:

MAINTENANCE PROGRAM

COMPONENT OR FUNCTION	TYPE OF OPERATION	INTERVALS
F-Theta scan lens	Check / Clean	Weekly: wipe gently with a dry cloth (or acetone / ethanol) or clean it with air blowing
Rack Air filters	Clean / Replace	Every 3 months (according to the environment and frequency of use)

4.3.1 F-THETA SCAN LENS CLEAN PROCEDURE

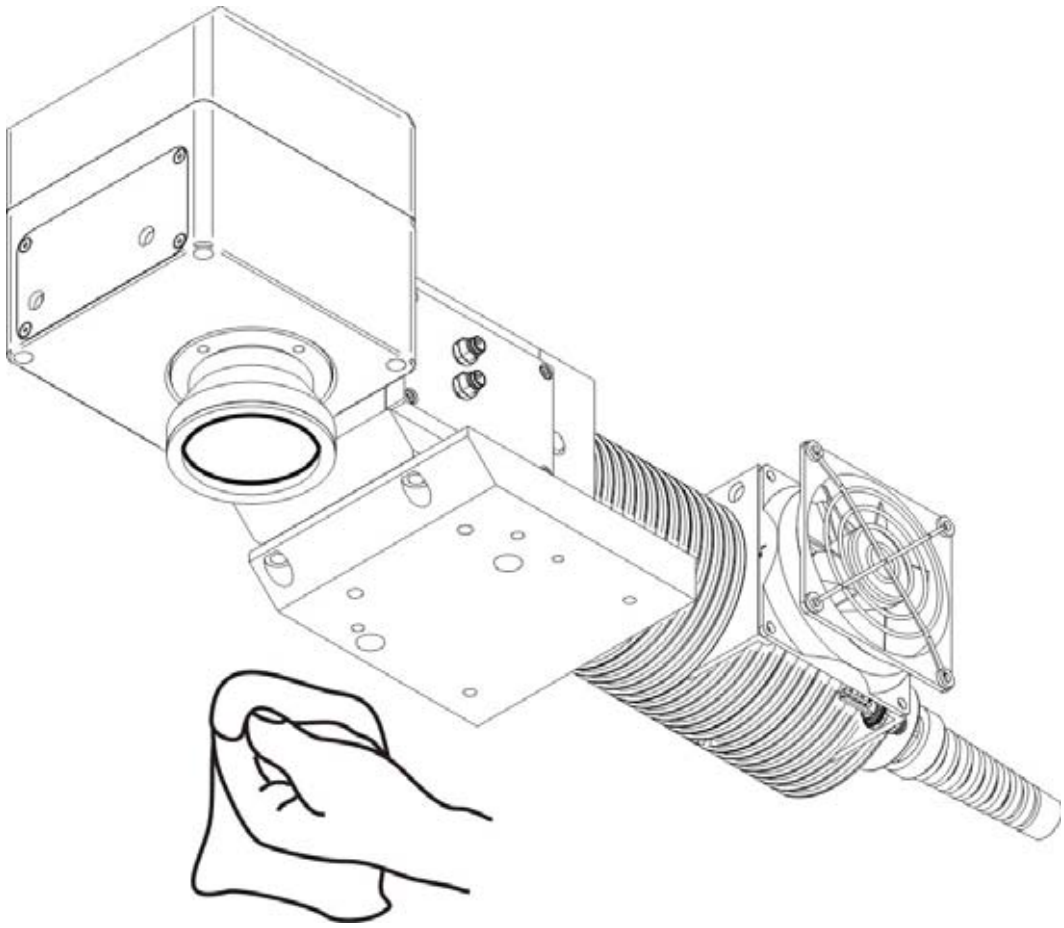


Figure 83: Cleaning laser output.

4.3.2 CLEAN AIR FILTER PROCEDURE

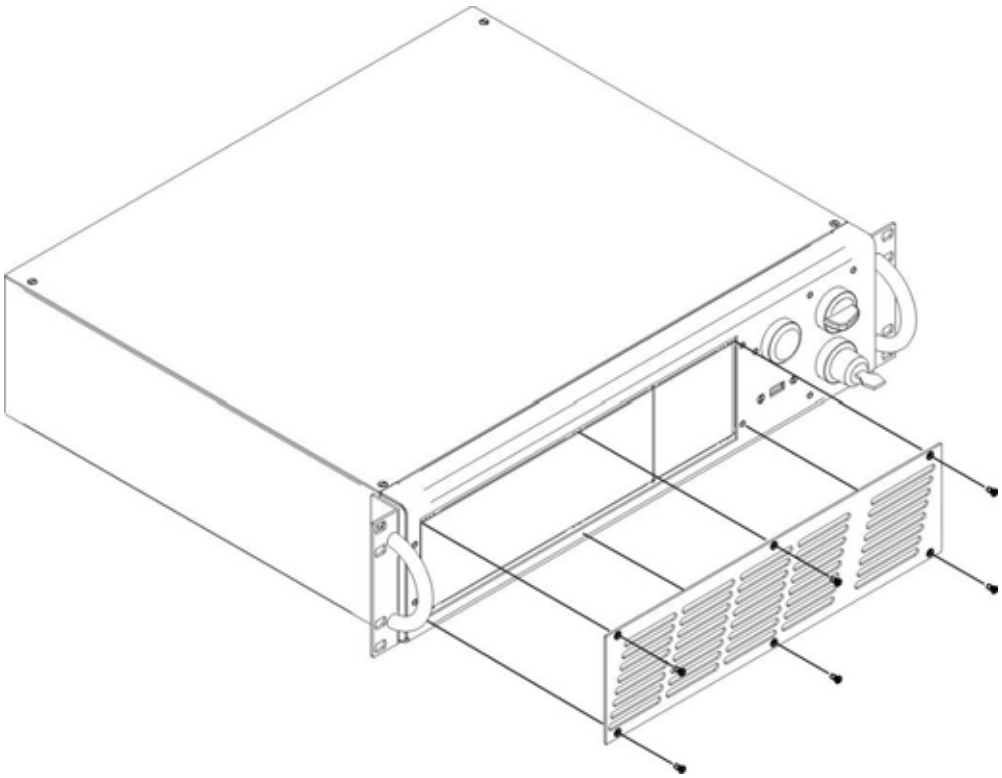


Figure 84: Clean air filter procedure.

WARNING:
Disconnect AC power cable before starting this operation!

1. Turn off key switch on controller unit
2. Disconnect AC power cable
3. Loosen screws of front panel and remove them
4. Remove filter
5. Clean filter with air blow or with neutral detergent and air-dry it
6. Reinstall the filter and protective cover

NOTE:
DO NOT install wet filter!

7. If filter cannot be cleaned, replace the filter
8. Suitable filter area available as spare parts

APPENDIX A: LABELS IDENTIFICATION

LABEL	DESCRIPTION
	Identification label
	Warning logotype (Laser)
	Laser Label (resonator) *
	Laser Label (control rack) *
	Aperture Label
	Label for non-interlock protective housing
	Caution, possibility of electric shock
	General Warning
	USB plug
2xT10A	**Fuses**

* Maximum output of laser radiation as per definition 3.55 of IEC60825-1 considering single fault conditions.

0 - I	**KEY/ENABLE Positions**
COMMAND BOX	**Command Box connector**
AXES (I/O)	**Control Axes connector**
INTERLOCK	**Interlock Connector**
INTERLOCK OUT	**Interlock OUT Connector**
LAN	**LAN connector**
RS232	**RS232 connector**
VGA	**VGA connector**
PHOT	**Photocell connector**
ENC	**Encoder connector**
RES	**Resonator connector**
MDR	**Scan Head connector**
RF	**Radio frequency connector**
FAN	**Fan connector**

EXTERNAL LABEL PLACING

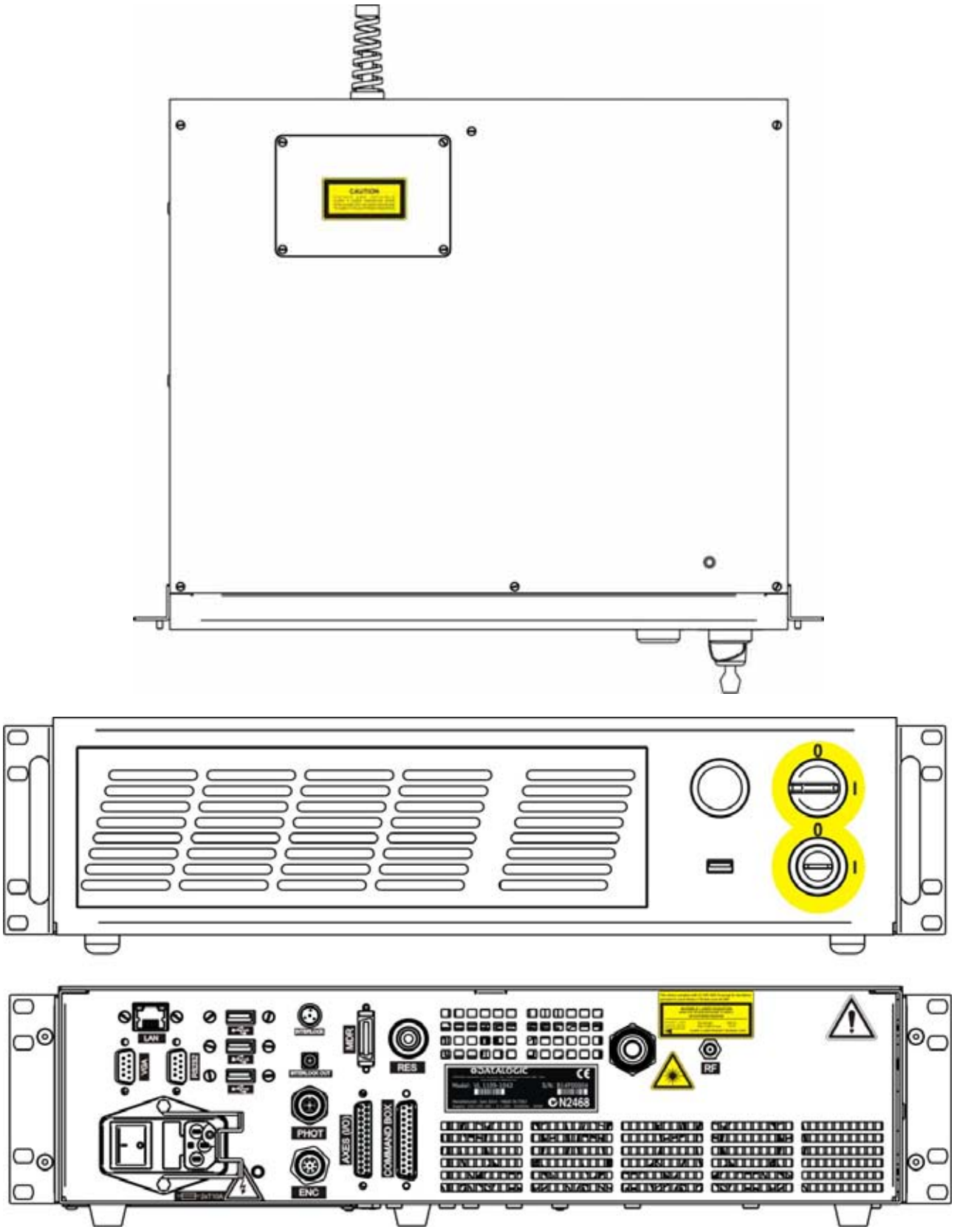


Figura 85: Positioning of external labels.

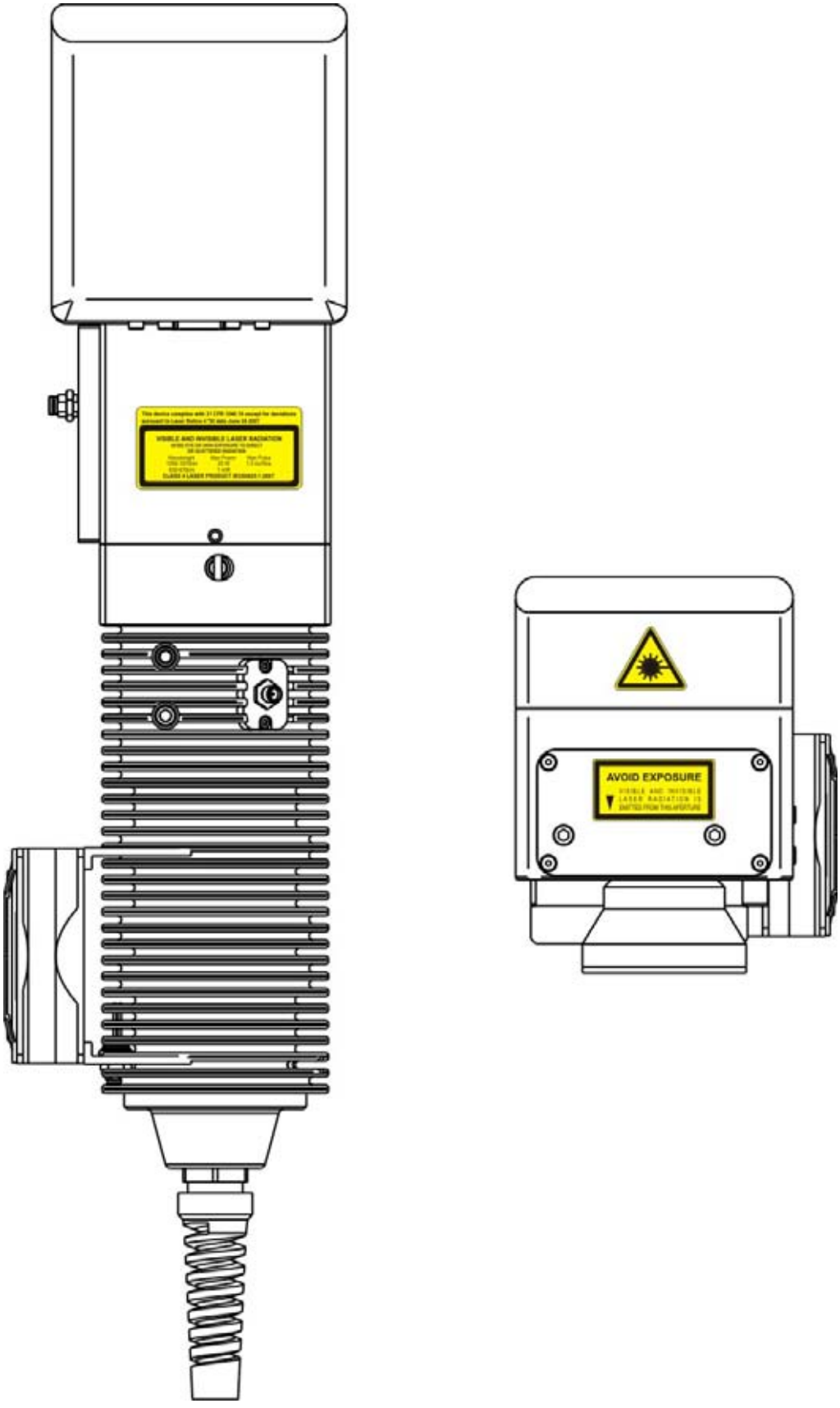


Figure 86: Positioning of external labels (resonator).

APPENDIX B: STANDARDS

LASER STANDARDS

The marking system VLase is designed to complies with the applicable sections of these laser standards:

EU : EN60825-1
USA : 21 CFR 1040.10

The marking system is classified as Class 4 Laser Product.

Datalogic Automation S.r.l., as manufacturer of laser source, provides a marking system which is NOT intended for immediate use, but it must be connected, by others, to other devices which have the final aim of creating a laser processing system.

The system manufacturer MUST ensure the safety of the laser processing machine according to its standards including the risk-analysis, implementation of safety measures, certification and testing of safety measures and the production of adequate information for use of the machine.

Datalogic Automation S.r.l. is available for providing to the system integrator/OEM all the information in its possession to help in complying with applicable standards.

CE COMPLIANCE

See Declaration of Conformity. Note about compliance to EN61010-1. The Risk Assessment regarding the DATALOGIC MARKING SYSTEM has been made in relation to the applicable point of that standard. It is under the responsibility of the system integrator to do a new Risk Assessment regarding the final installation of the DATALOGIC MARKING SYSTEM.

WARNING!

This is a Class A, Group 2 product according EN55011. In a Class B environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC COMPLIANCE

Modifications or changes to this marking system without the expressed written approval of Datalogic could void the authority to use the system.

This system complies with PART 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This system may not cause harmful interference, and (2) this device must accept any interference received, including interference which may cause undesired operation.

This system has been tested and found to Comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the system is operated in a commercial environment. This system generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this system in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

APPENDIX C: GUIDE FOR SYSTEM INTEGRATOR

VLase marking systems are classified as Class 4 Laser product. They are intended to be installed in a system by system integrator/OEMs which has the final responsability of the end product Classification.

Final system MUST comply to all requirements in order to classify the system as:

- CLASS 1 LASER PRODUCT if end user could be exposed to a radiation not exceed the AEL for Class 1 during marking operation (1064nm)

- CLASS 2 LASER PRODUCT if end user is not exposed to a radiation during marking but could be exposed to the radiation not exceeding the AEL for Class 2 during focusing and aiming (635nm)

The marking system are designed to easily fulfill all the requirement as per EU/USA standards.

Below a YES/NO table for features of Class 4 Laser. A "NO" in the VL-IR column means that the feature is available through dedicated connector and MUST be completely implemented by the system integrator/OEM.

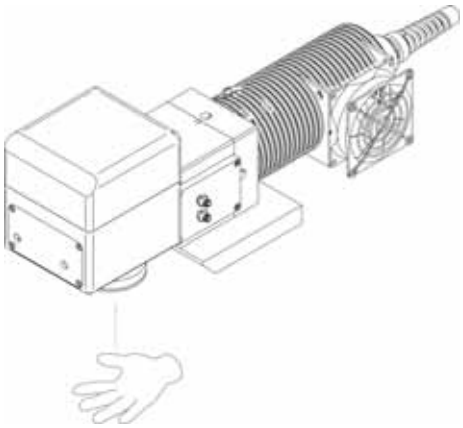
FEATURE	LOCATION/DESCRIPTION	required by USA STANDARDS	required by EU STANDARS	VL-IR
KEYSWITCH	RACK On/Off key switch controls power to laser electronics. Key can not be removed from switch in "On" position	YES	YES	YES
LASER ON INDICATOR	Panel Indicator (RED) Indicates that laser is actively lasing or ready to emit according to the state	YES	YES	YES
DELAY	RACK User selectable delay after ENABLE INPUT	YES	NO	YES
Power Fail Lockout	RACK Disable current driver/laser output if input power is removed then later reapplied (AC or DC power supply failure or remote interlock actuation) while key switch is in "ON" position	YES	NO	YES
Interlock	Panel connection Disables current driver/laser output when a remote interlock switch on an equipment door or panel is opened	YES	YES	NO
Warning Label	External / Internal	YES	YES	YES*

* The marking system labels comply with Class 4 Laser Product Requirement. The labels to be used in the machine where VLase are installed MUST comply with the requirements for the Laser Class of the machine itself.

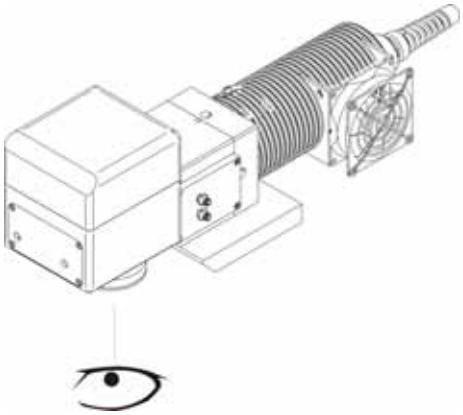
APPENDIX D: NOTE ABOUT LASER

LASER SAFETY

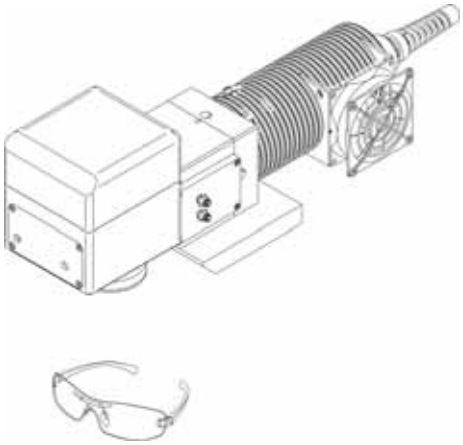
The following information is provided in compliance with regulations set by International Authorities, and it refers to the correct use of marking system.



NOTE:
It is crucial that you protect yourself against beams of reflected or direct light as they cause permanent damage to your skin.



NOTE:
Staring directly at a laser beam may cause irriversible damage to your eyes.



NOTE:
Wear safety goggles while using the system!

NOTE:
BEFORE INSTALLING AND USING THE LASER, **READ CAREFULLY** THE APPENDIX CONCERNING **LASER SAFETY**.

LASER RADIATION

Laser radiation is an electromagnetic emission with a micrometric wavelength which ranges from the long infrared (CO_2 Laser), close infrared (Nd Laser: Yag, Nd: YVO_4), visible (He Laser: Ne or Argon) and ultraviolet (excimer laser).
It should be considered non-Ionizing Radiation. In VLase marking system, the emission of a crystal bar is stimulated by “optical pumping” generated by a Diode Laser. The continuous reflection of Photons, between a front mirror and rear mirror, creates a positive reaction so that their number continues to increase, until reaching the concentration necessary to produce a beam which projects from the semi-reflecting front mirror. The radiation (which we can imagine as a “Beam of invisible light”) is then Collimated and Focalized with Lenses at a point where the intensity becomes high enough to be able to react with various materials producing an alteration in them due to thermal effect.
The radiations of VLase marking system are visible and invisible and the Eye receives it almost in its entirety without using the natural defense provided by pupil reflex! Added to this is the fact that it is generally very intense, with the result that it can be very harmful to the eye and present vision problems.

NOTE:
Directly viewing a laser beam **can cause irreversible damage** to vision.

To prevent permanent damage to vision, a few precautions must be taken.
All individuals who may be exposed to dangerous levels of laser radiation, must know that the laser is active and wear protective goggles if necessary.

Due to its high power, the laser integrated in the Datalogic Automation system provokes reflected laser light from flat surfaces. Reflected light is potentially dangerous for the eyes and skin. Electromagnetic emission with a micrometric wave length is placed in long infrared, and is therefore invisible, thus it is not clear where reflected beams are aimed.

NOTE:
It is indispensable to protect yourself from reflected light beams, because they can be sufficiently intense to create permanent injury to the eyes or skin.

In addition to possible injury to the eyes or skin, direct laser emission can cause flammable materials to burn like organic solvents (alcohol, acetone) or gasoline and cause fabric and clothing to burn.

NOTE:
This marking system is classified as **class 4**. Class 4 includes lasers which can produce risks, not only from **direct** or **reflected** radiation, but also from **scattered** radiation! The laser sources may be a significant risk for the skin and risk of burning flammable materials.

ABSORPTION OF LASER RADIATION

Human skin absorbs electromagnetic radiation in different ways depending on the wave length of the radiation. Both the eye and skin have a “predisposition” for accepting certain wave lengths, and are more unresponsive to absorbing others. In the specific case of the Eye, the Cornea and Crystalline lens let all the wave lengths from 400 to 1400 nm pass and reach the Retina, even with various attenuations. They include the range from visible light to IRA infrared. Thus Nd:YVO_4 laser radiation (1064 nm wavelength) is included in this range and **leads to direct Retina exposure!**
In terms of the Skin, the “biological window” has different absorption percentages but is not dissimilar in terms of wave length. The maximum exposure values for Skin are much different compared to those tolerated by the Eye.

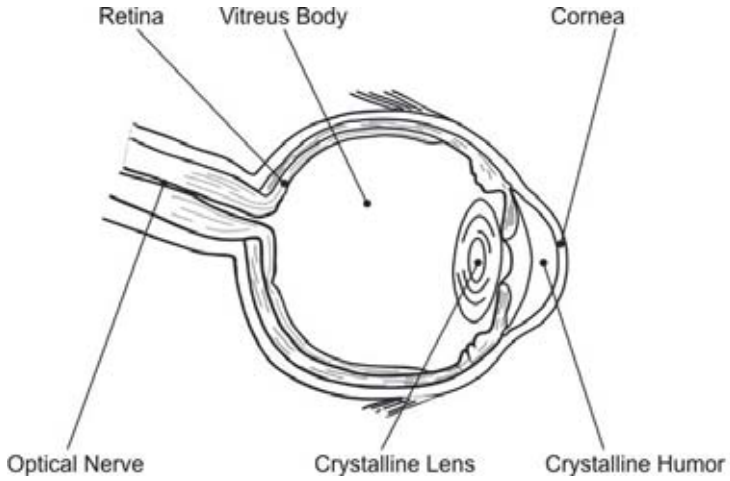


Figure 87: Eyeball section.

In terms of the damage mechanism that absorbed radiation can cause, it also depends on the wave length. Short lengths (ultraviolet: UV-C 180-280nm; UV-B 280-315 nm, UV-A 315-400 nm) generally cause photo-chemical effects:

- cataract, or opacification of the crystalline lens
- melanic coloring, or reddening of the skin

Greater wavelengths (infrared: IR-A 780-1400 nm; IR-B 1400 3000 nm; IR-C 3000-10^{E6} nm) generally cause thermal effects:

- detachment or photocoagulation of the retina
- burning of the skin

The degree of injury obviously depends on the **amount of absorbed radiation** and the **instantaneous power** of the radiation source.

CLASSIFICATION AND DANGER LEVEL

Regulations have established different classes of Laser danger based on the ability to injure people, from Laser class 1 (basically safe in all conditions) to Laser class 4 dangerous in various conditions.

Lasers which can produce risks, not only for direct or reflected radiation, but also for scattered radiation belong to class 4. These Laser sources can also have a significant risk for the Skin and fire risk for flammable material. For these reasons, the User must put into effect all measures aimed at containing the radiation to make sure that it is terminated at the end of its useful path. The operator must also be informed of the risks from exposure to Laser radiation and must wear specific I.P.D. (individual protection devices) including goggles that protect against radiation and are certified as suitable for this use.

NOTE:
The VLase marking system contains a **class 4 invisible** laser source.

RADIATION VIEWING CONDITIONS

The Laser output by the resonator is to be considered as a highly collimated and intense monochromatic light source. Due to these characteristics it can be seen as a “punctiform source” of high luminosity. This means that its image is then focalized on the Retina in a very small spot with a dangerously high power density! If the beam becomes divergent and scatters to a non-reflecting screen, then there is an “extended vision” of the image, with a decisively less dangerous power density. So there are different types of radiation viewing based on the access to the radiation and consequently different degrees of dangerousness.

DIRECT VIEWING OF THE LASER BEAM

This type of viewing is the most dangerous and can occur at the outlet of the laser aperture after having removed the lens. It is to be avoided at all costs! No protective goggles represent a valid means against direct viewing of the beam.

DIRECT VIEWING OF THE BEAM AFTER MIRROR REFLECTION

This may occur by directing the beam on a reflecting surface.
Viewing of a mirror reflected beam from a flat surface is very dangerous and equal to direct viewing.

DIRECT VIEWING OF THE BEAM OUTPUT BY AN OPTICAL FIBER

This happens if an Optical Fiber disconnects from the resonator. Viewing of the beam is dangerous up to a significant distance. Filters and Goggles do not ensure safety.

DIRECT VIEWING OF THE BEAM AFTER FOCUSING

This occurs if the laser beam is not extinguished with an opportune absorber at the end of its useful path. Looking at the beam is dangerous up to a considerable distance. Filters and goggles can ensure safety for brief exposure, as long as they are the right size and certified.

SCATTERED VIEWING OF THE BEAM AFTER FOCUSING

This is the most frequent viewing, but opportune Filters and Goggles can ensure safety, even for prolonged exposure.
The Optical Risk Nominal Distance O.R.N.D. for VLase are showed in the next paragraph.

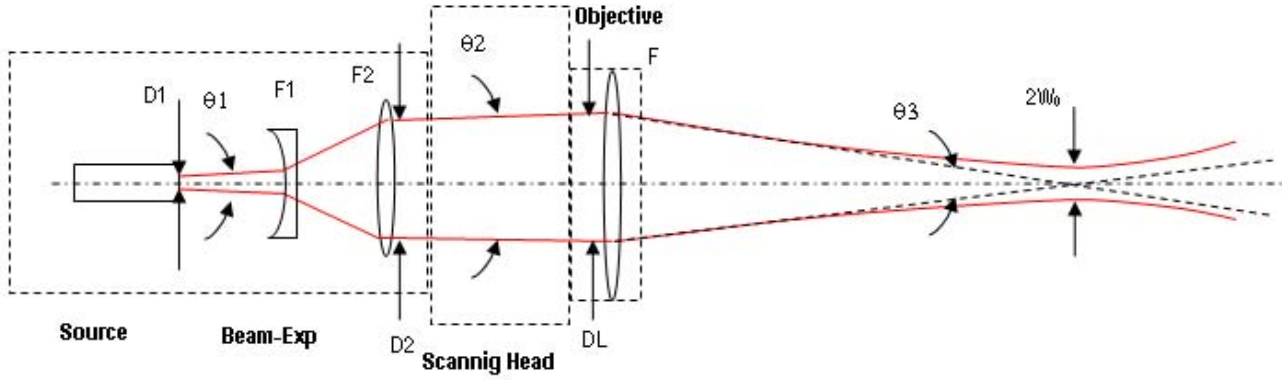
NOTE:

Always use goggles with conformity certificate.

Remember that **no goggles can provide prolonged protection from direct or mirror-reflected radiation!**

DNRO DETERMINATION AND O.D. OF PROTECTION GOGGLES

In order to determinate the characteristics of the protection goggles, it is essential to determine the characteristics of the radiation, knowing its optical path, the dimensions of the beam and its divergence.



In particular, it is very important to know the real divergence of the beam in output from the scan lens (F-Theta).
With all these optical datas it is possible to do the calculations of the nominal distance of optical risk (DNRO) and of the optical density (DO) requested to the protection filters of the laser radiation.

Calculations have been done following the CEI EN 60825-1 (2007) Normative regarding nominal distance and optical risk in the worst condition and in case of accident exposition of 10s for direct radiation and 100s for diffused radiation.

Wavelength	1064 nm
Application type	Marking
Emission type	Q-Switched
Observation type	Direct radiation
Pulse energy	VL-IR 1109-TFS2: 480 μJ @ 10 kHz VL-IR 1159-TFS2: 650 μJ @ 15 kHz VL-IR 1209-TFS2: 550 μJ @ 20 kHz
Pulse duration	VL-IR 1109-TFS2: 15 ns VL-IR 1159-TFS2: 12 ns VL-IR 1209-TFS2: 8 ns
Beam Diameter at 9X Beam Expander Output (1/e2)	VL-IR 1109-TFS2: 6.0 mm VL-IR 1159-TFS2: 5.0 mm VL-IR 1209-TFS2: 5.0 mm
Beam divergence on the lens	VL-IR 1109-TFS2: 0.6 mrad VL-IR 1159-TFS2: 0.6 mrad VL-IR 1209-TFS2: 0.8 mrad
Focal of the FTheta lens	160 mm
Real divergence after the lens	VL-IR 1109-TFS2: 37,5 mrad VL-IR 1159-TFS2: 31,2 mrad VL-IR 1209-TFS2: 31,2 mrad
Exposition time	10 s

ACCIDENTAL CONDITION OF VISION OF THE DIRECT REFLECTED RADIATION

Assuming a direct exposition of 10 sec at a nominal distance of 0,5 m (worst case) is possible to calculate the suitable optical density for safety goggles.

The OD (optical Density) in last column assure to reduce laser radiation below max acceptable level:

D.O.= log (H/EMP) where EMP is the Maximum Permissible Exposure and H is the radiant exposure.

Source	DNRO (Nominal Ocular Hazard Distance)	OD (Optical Density)
VL-IR 10 W Marker with F-Thêta 160 mm	25,2	> 3,70
VL-IR 15 W Marker with F-Thêta 160 mm	26,8	> 3,85
VL-IR 20 W Marker with F-Thêta 160 mm	28,8	> 3,82

SCALE INDEX OF THE PROTECTION GOGGLES FILTER

The scale index L of the filters indicates the stability to the radiation, that means the ability of the filter to maintain its characteristics unchanged. This stability is certified by the producer according to the EN 207 with tests conducted for 10s or 100 pulses.
It is then necessary to verify that the scale index of the adopted filter is stable for this period and foreseen an adequate over dimensioned in order to make sure that it could last longer than the accidental exposition period.

In case of exposition at 0,5 m for 10 sec the suggested optical density for safety googles is CLASS L4.

EYES AND SKIN RISKS

If exposed to intense Laser radiation, even of a short duration, or a less intense but longer lasting duration, both the Cornea and the Retina can burn and be damaged irreparably forever. This consequence is completely realistic in the event of direct viewing of a class 4 Laser beam.

If subject to direct focalized radiation, even the skin can burn.

In addition, it is necessary to bear in mind that a collateral ultraviolet radiation may exist with the main radiation: long exposure may cause skin cancer.

GENERAL SAFETY REGULATIONS

The User must comply with the regulations and work in the best possible safety conditions to prevent decreasing the degree of marking system safety. Therefore it is necessary to develop a Standard Operating Procedure (S.O.P.) related to maneuvers to effect for turning on and off the marking system. This procedure, which shall be prepared around the time of installation, shall serve as a reference for the Operator and shall be written in his/her language.

Training is essential and must include:

- Familiarization with system operating procedures.
- Knowledge of the biological effects of radiation on the Eyes and Skin.
- Understanding of the necessity for Individual Protection Devices (I.P.D.)

COLLATERAL RISKS

If the intended use of the marking system changed, for example for material processing applications, collateral risks may arise represented by the production of fumes and vapors which may be irritating or toxic, if not removed and adequately filtered before being released into the air again.

NOTE:
It is advisable **not to change the intended use** without previously contacting the Manufacturer.

An additional risk may be represented by fire caused by processing materials other than those the marking system is designed for.

NOTE:
When processing **flammable material**, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the system is commissioned.

NOTE:
Do not subject **materials other** than those the system was designed for to radiation.

The most serious collateral risk associated with laser marking system, which may be fatal, is electricity.
This may occur when the manufacturer's warning and procedures are not followed. Unauthorized and untrained personnel must never do any work on the electrical part. The safety devices must never be removed and their operation must be periodically checked.

NOTE:
Do not work on the electrical part if you are not trained to do so. **Do not remove protection devices**.

For example, during the intended use of the marking system, if a material being processed undergoes alterations and produces irritating and/or toxic fumes, it may be necessary to remove the fumes from processing before releasing them into the air.

An additional risk may be represented by fire caused by processing materials other than those the system was designed for.

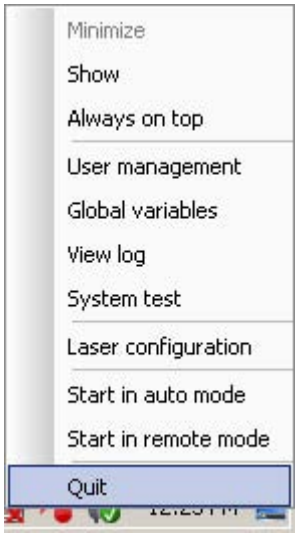
NOTE:
Do not subject **materials other** than those the system was designed for to radiation.

NOTE:
When processing **flammable material**, such as plastic, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the system is commissioned and follow the instructions in the **SAFETY** Chapter, in the **Collateral Risks** section.

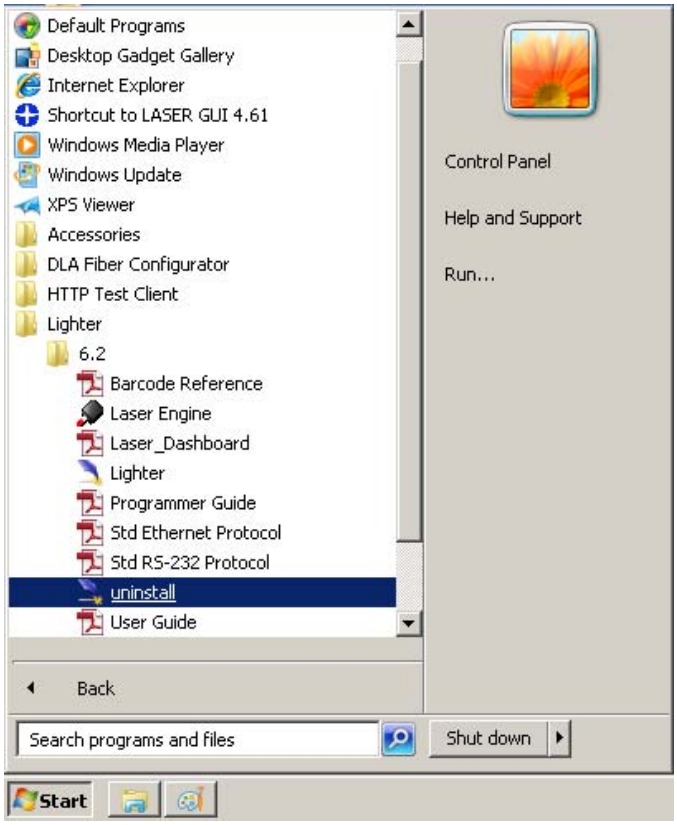
APPENDIX E: SOFTWARE UPGRADE

This document describe how to update SW version:

1. Close the Lighter and Laser Engine (Click on "*QUIT*")



2. Do Lighter "*UNISTALL*": you can't run the new installer before having removed the old SW version

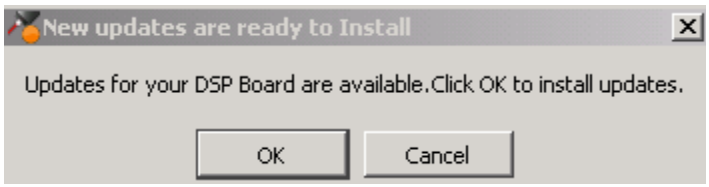


3. Wait the end of unistall procedure.

4. Run new Lighter installer from an external device (USB dongle).

5. Wait until installation procedure is completed.

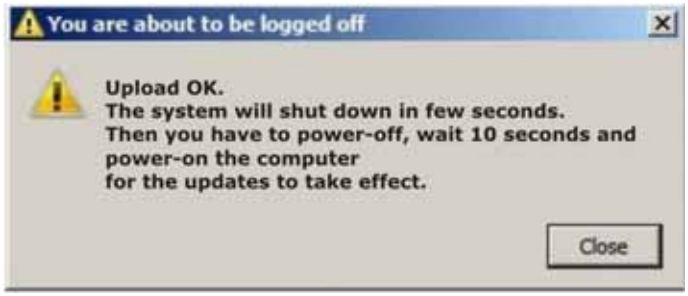
6. Depending on whether the Lighter update includes any control board updates, the following screen may appear:



- Procedure with control board update:

  - press OK to execute control board update

  - upon completion, a window informs user that data is automatically saved in the system


You are about to be logged off
Upload OK.
The system will shut down in few seconds.
Then you have to power-off, wait 10 seconds and
power-on the computer
for the updates to take effect.
Close

  - system will be shut down automatically within the next 10 seconds

WARNING:
DO NOT restart the system or turn off the system!

  - wait until system shuts down automatically (black screen)

  - power off the system to complete installation

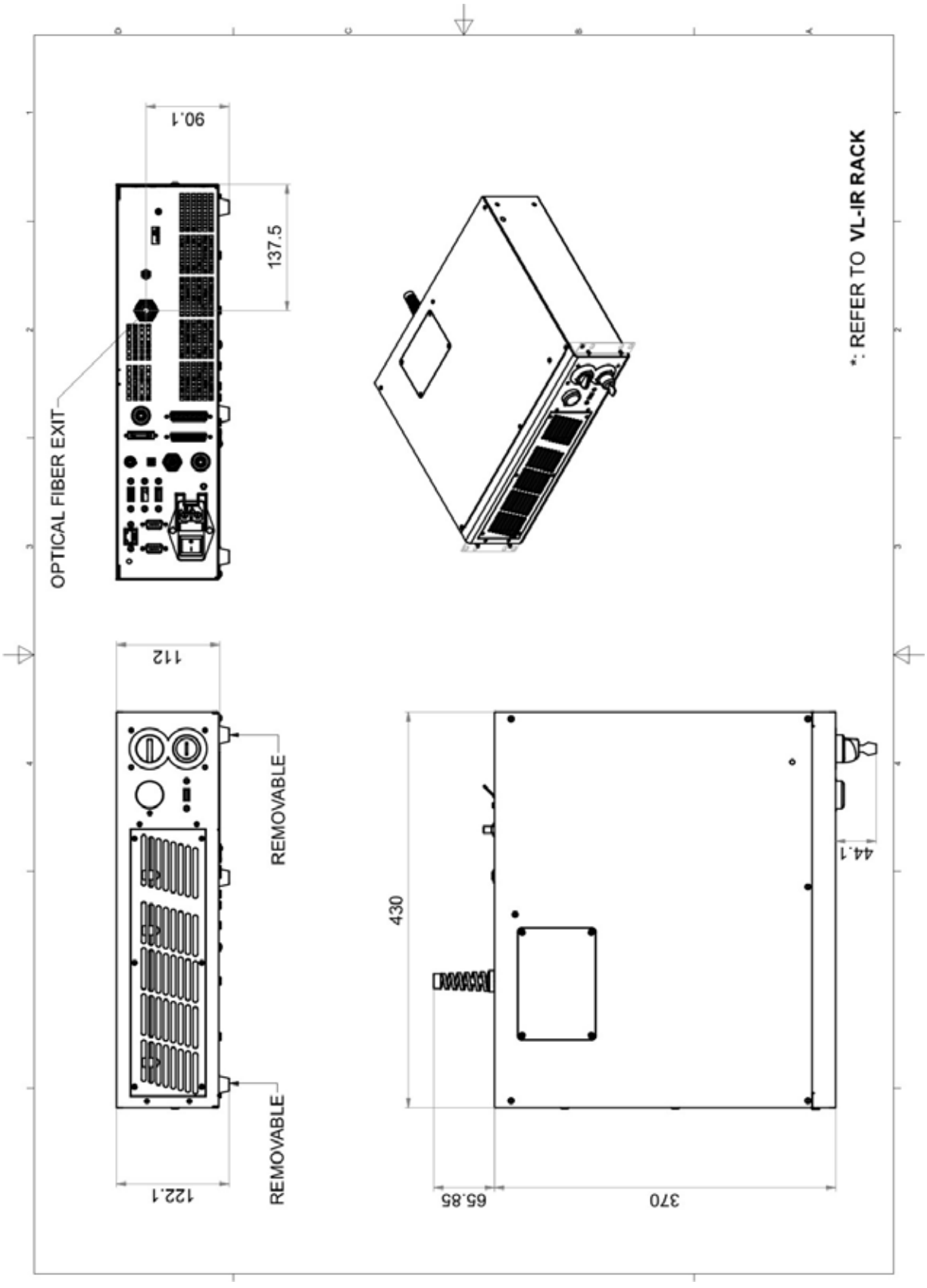
- Procedure without control board update:
    - a window informs user that data is automatically saved in the system

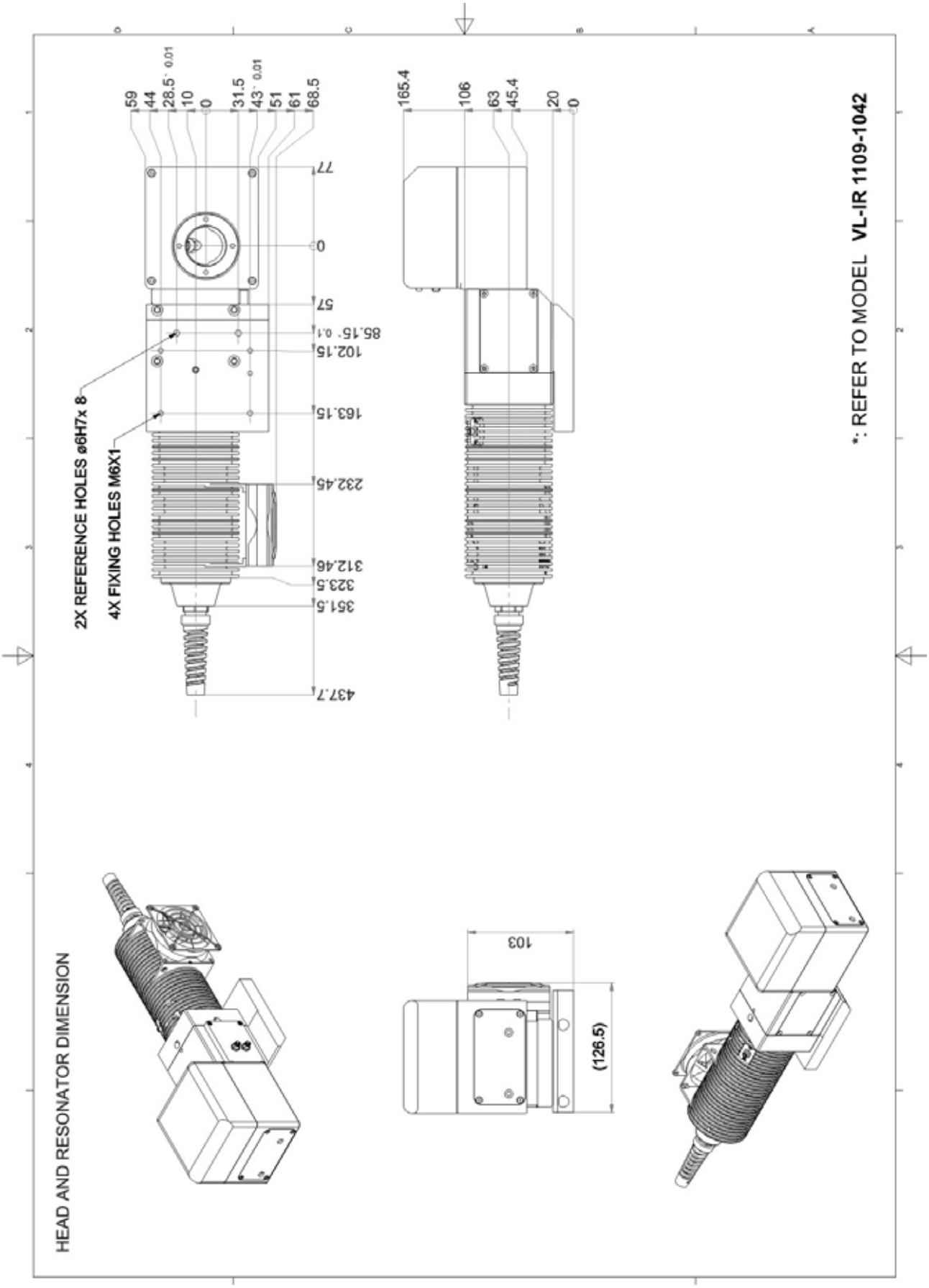
    - system will be restarted automatically within the next 10 seconds

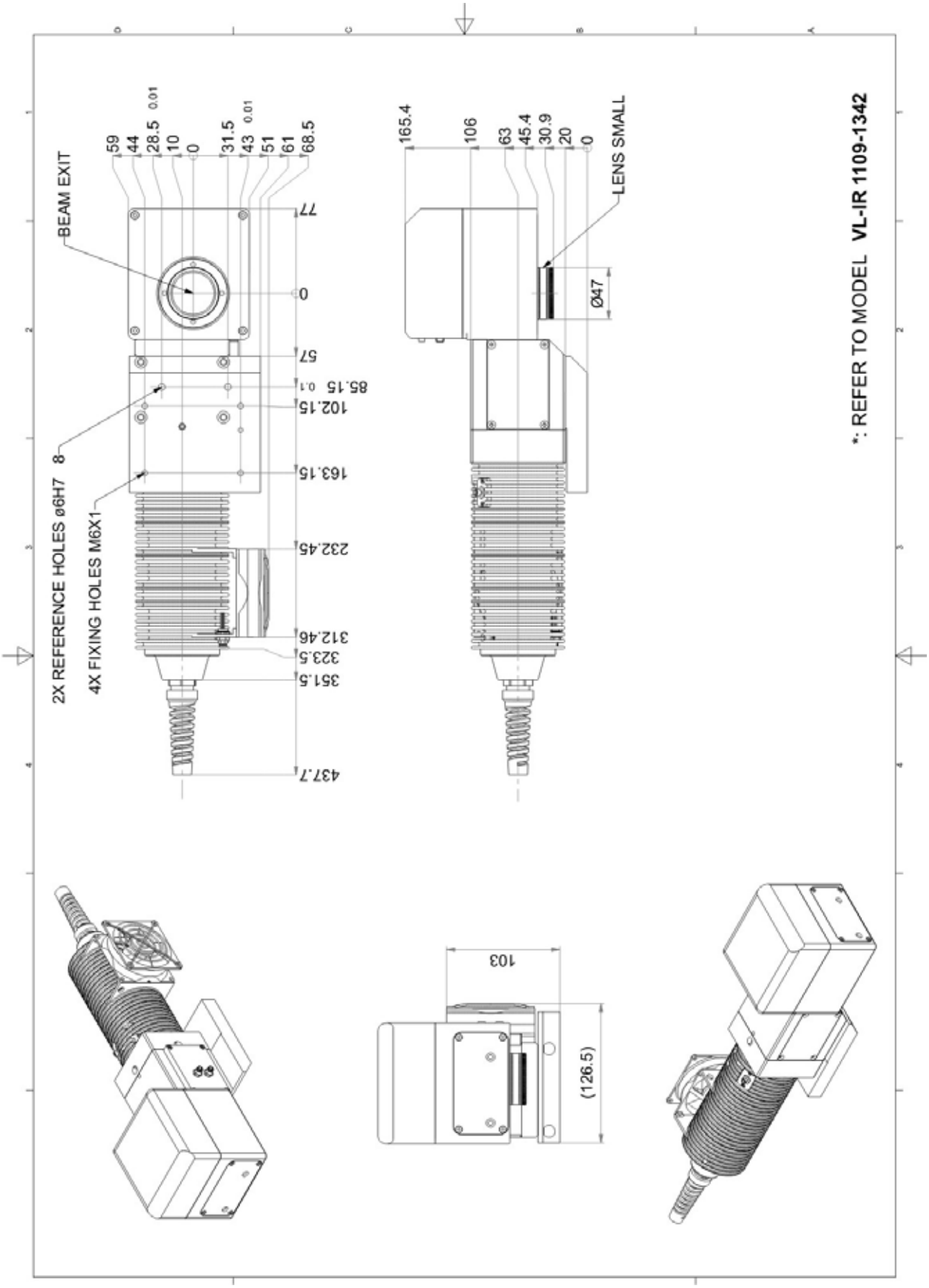
WARNING:
DO NOT restart the system or turn off the system!

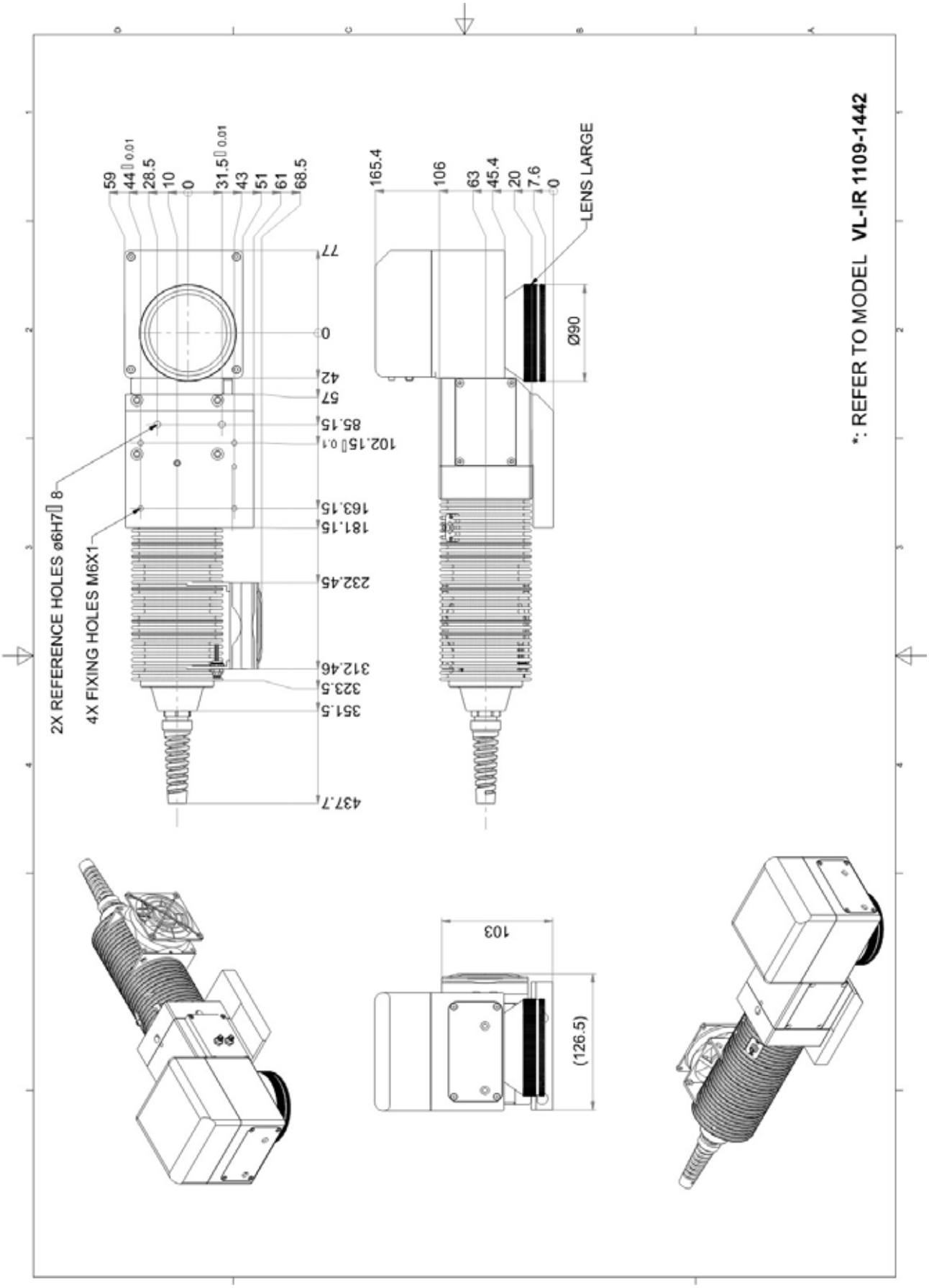
    - wait until system is restarted automatically

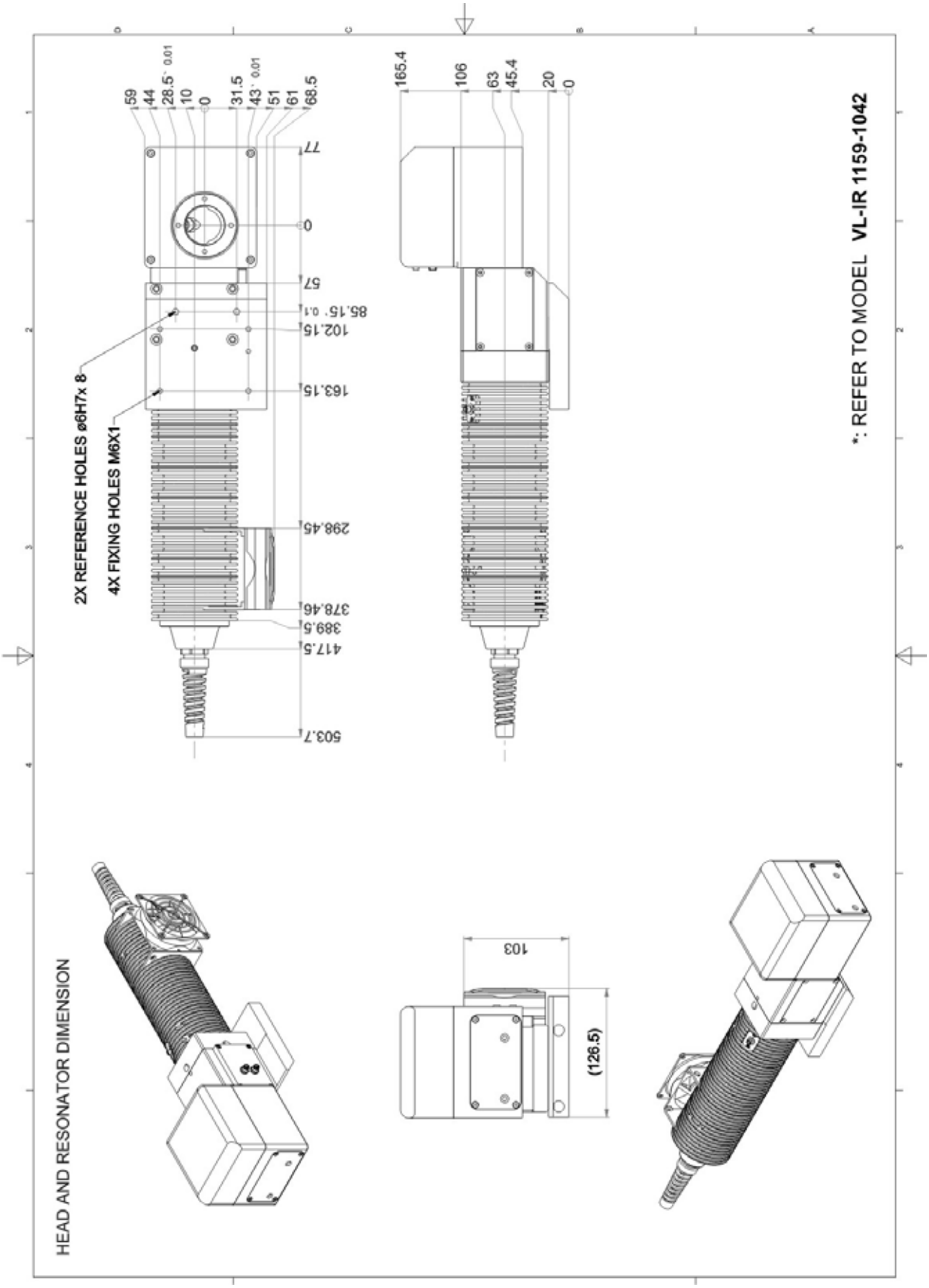
APPENDIX F : MECHANICAL DRAWINGS

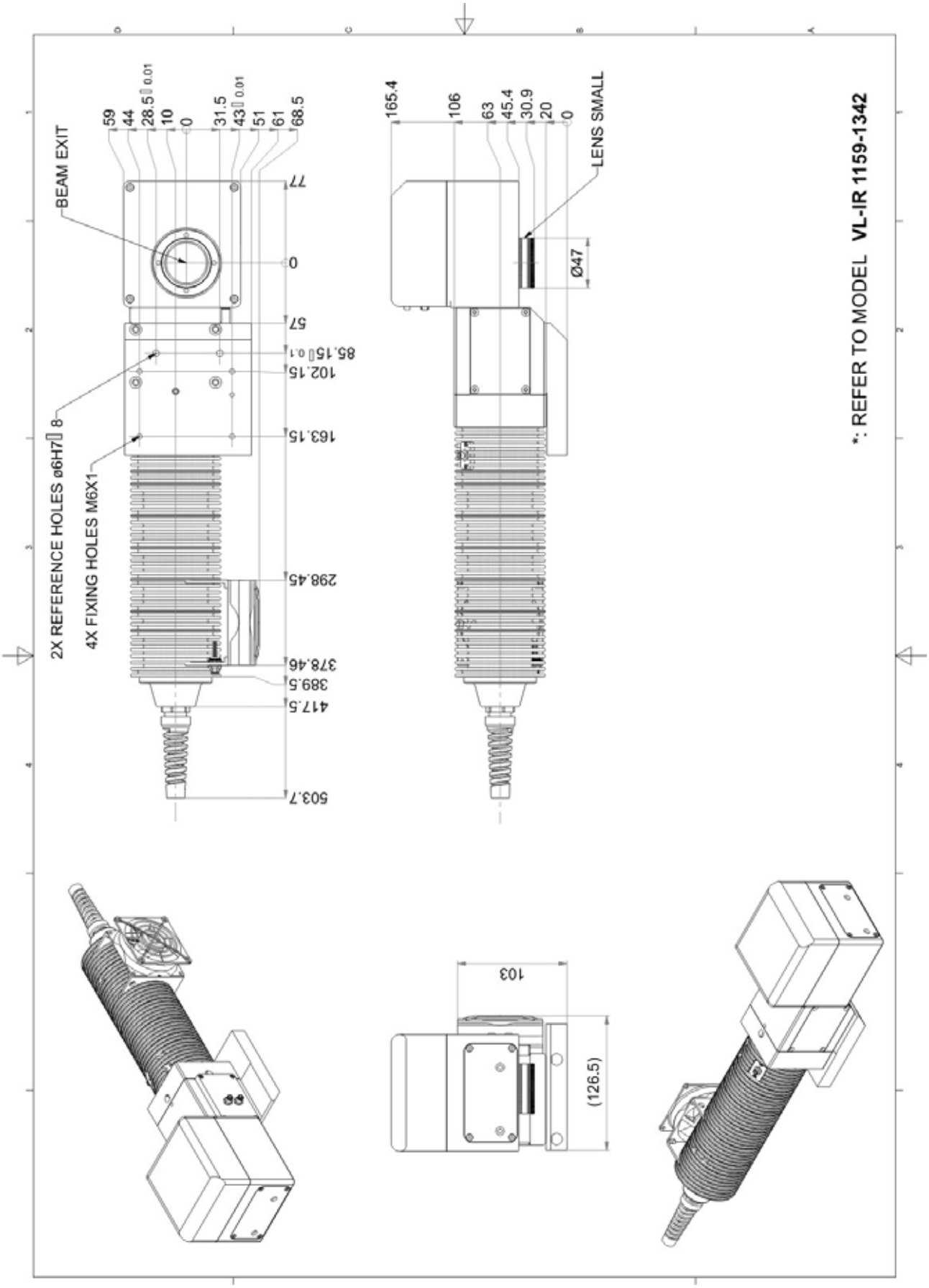


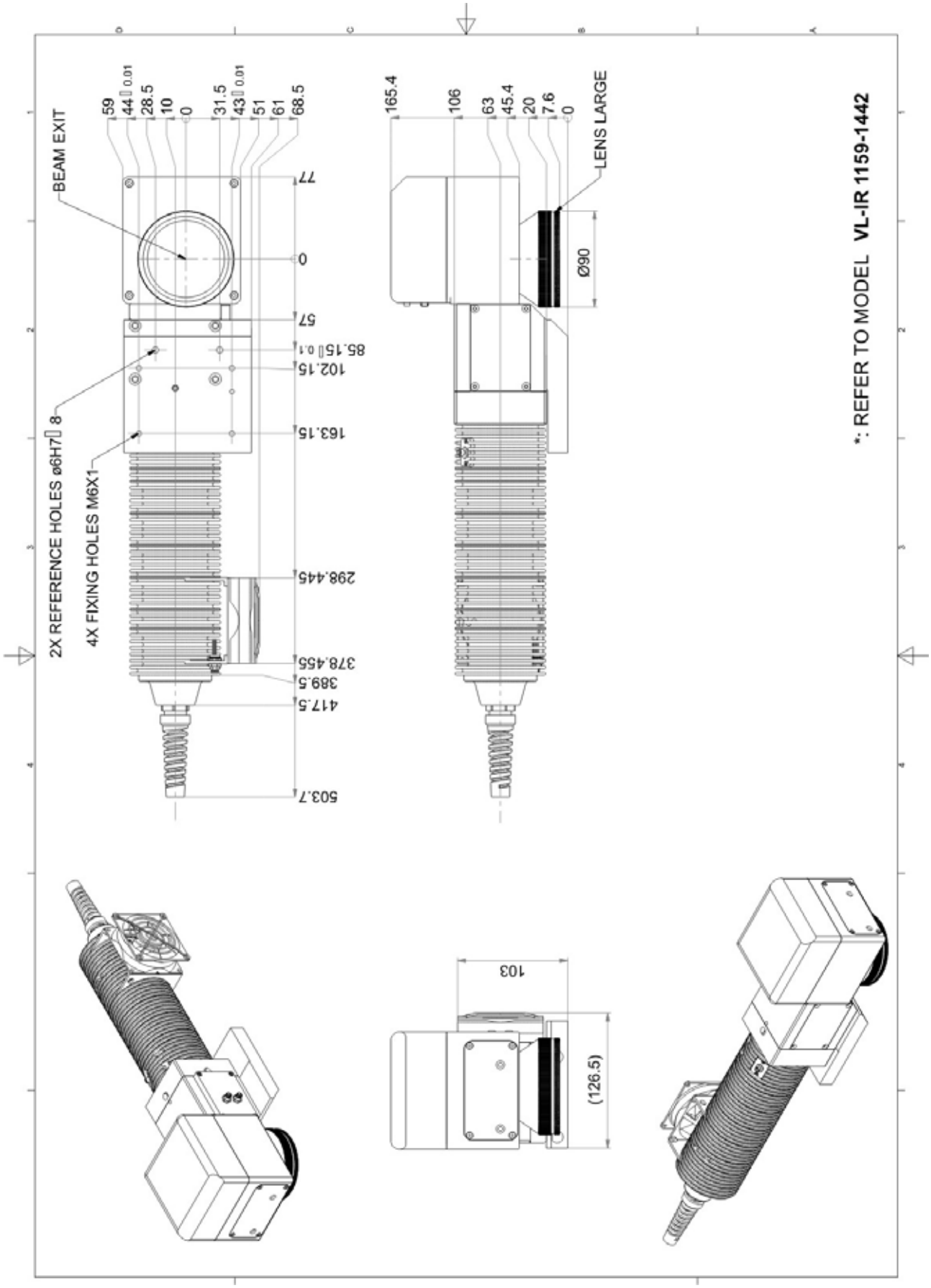

HEAD AND RESONATOR DIMENSION
2X REFERENCE HOLES ø6H7x 8
4X FIXING HOLES M6X1
*: REFER TO MODEL VL-IR 1109-1042
59
44
28.5
10
0
31.5
43
51
61
68.5
77
0
57
85.15
102.15
163.15
232.45
312.46
323.5
351.5
437.7
165.4
106
63
45.4
20
0
103
(126.5)

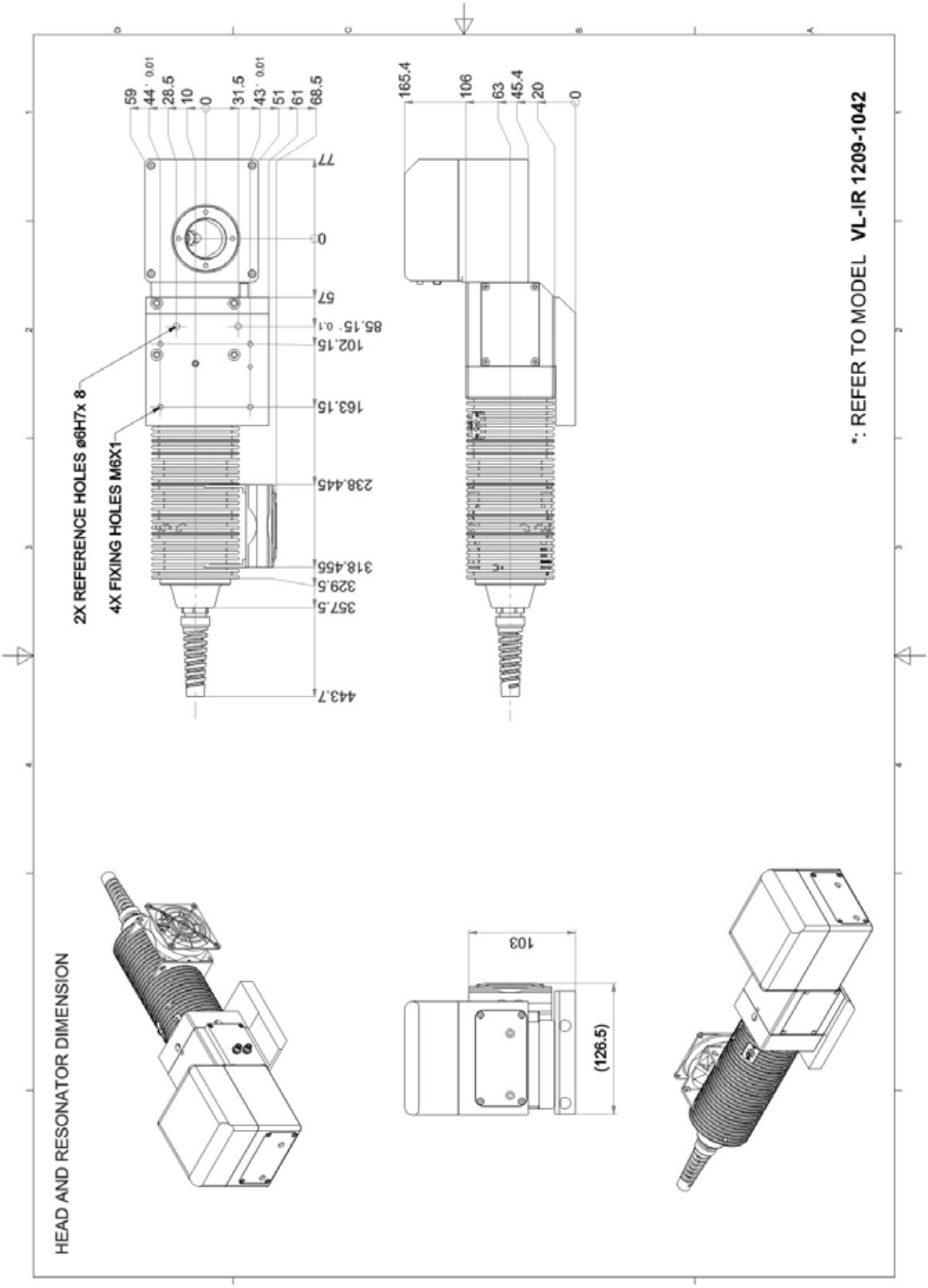

*: REFER TO MODEL VL-IR 1109-1342
BEAM EXIT
2X REFERENCE HOLES ø6H7
4X FIXING HOLES M6X1
LENS SMALL
Ø47
103
(126.5)

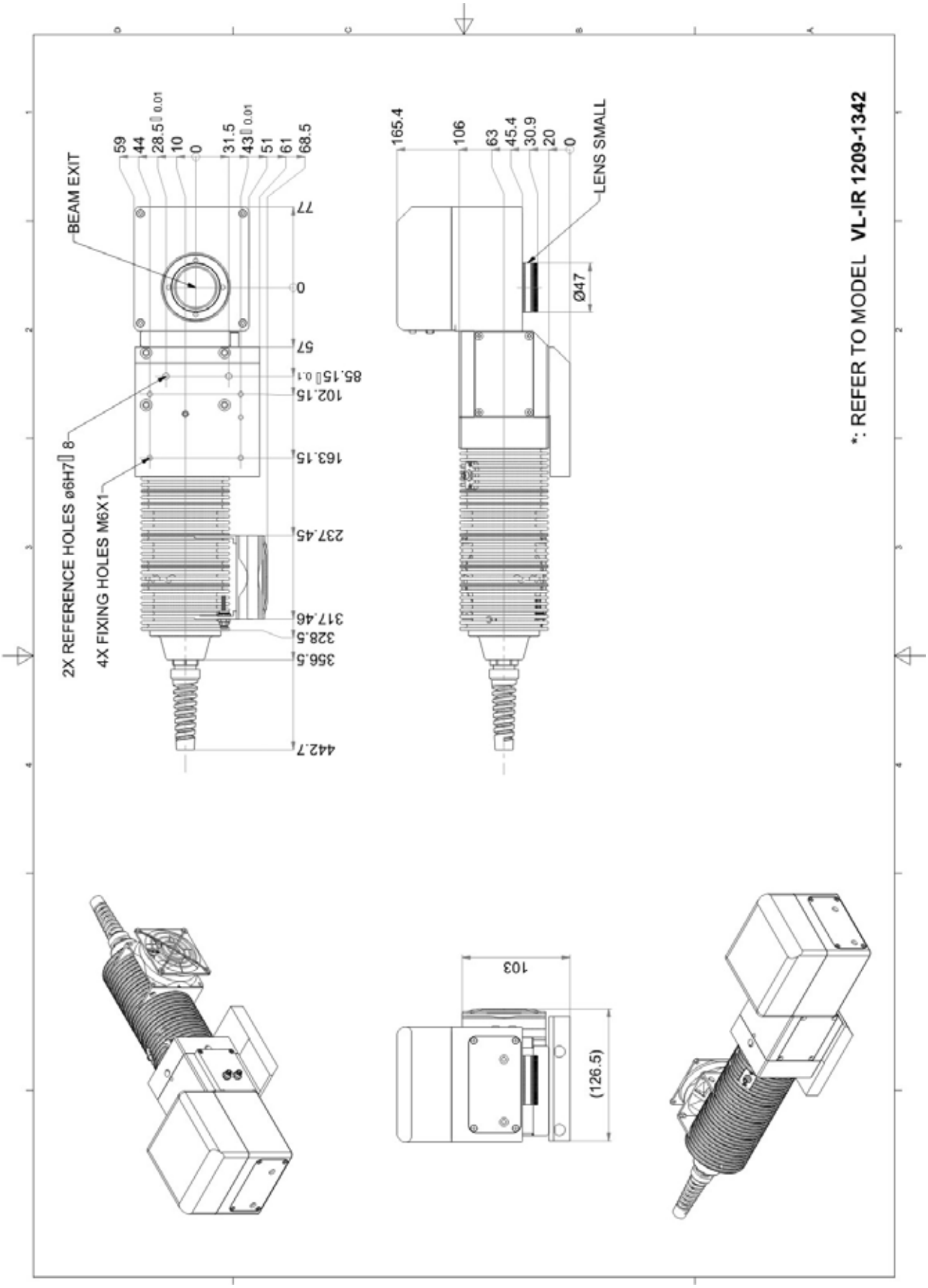

*: REFER TO MODEL VL-IR 1109-1442
LENS LARGE
Ø90
165.4
106
63
45.4
20
7.6
0
59
44
28.5
10
0
31.5
43
51
61
68.5
77
0
42
57
85.15
102.15
163.15
181.15
232.45
312.46
323.5
351.5
437.7
2X REFERENCE HOLES ø6H7 8
4X FIXING HOLES M6X1
103
(126.5)

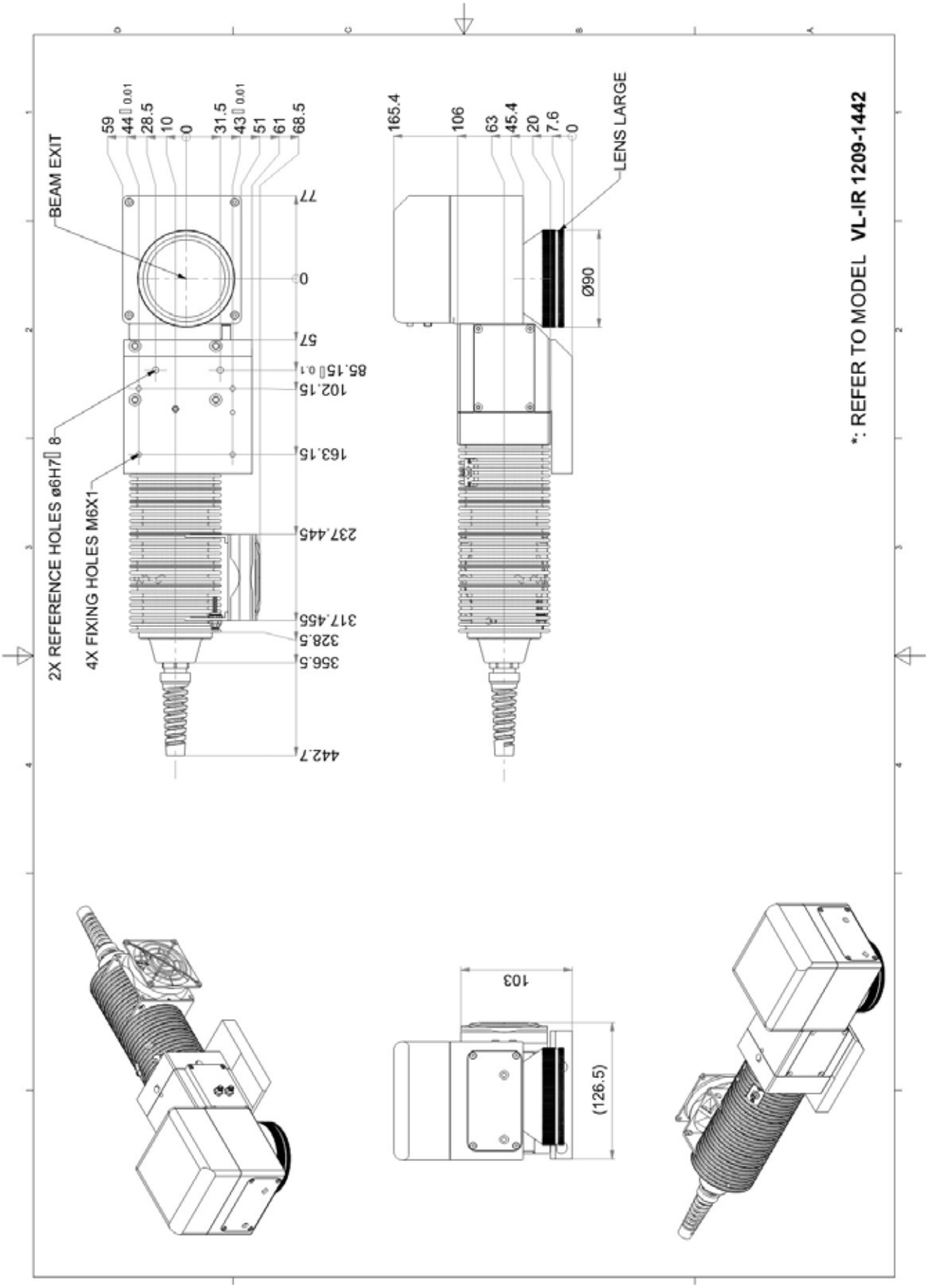

HEAD AND RESONATOR DIMENSION
2X REFERENCE HOLES ø6H7x 8
4X FIXING HOLES M6X1
*: REFER TO MODEL VL-IR 1159-1042
59
44
28.5
10
0
31.5
43
51
61
68.5
77
0
57
85.15
102.15
163.15
298.45
378.46
389.5
417.5
503.7
165.4
106
63
45.4
20
0
103
(126.5)


BEAM EXIT
2X REFERENCE HOLES ø6H7 8
4X FIXING HOLES M6X1
59
44
28.5 0.01
10
0
31.5
43 0.01
51
61
68.5
77
0
57
85.15 0.1
102.15
163.15
298.45
378.46
389.5
417.5
503.7
165.4
106
63
45.4
30.9
20
0
LENS SMALL
Ø47
*: REFER TO MODEL VL-IR 1159-1342
103
(126.5)


BEAM EXIT
2X REFERENCE HOLES ø6H7 8
4X FIXING HOLES M6X1
59
44 0.01
28.5
10
0
31.5
43 0.01
51
61
68.5
77
0
57
85.15 0.1
102.15
163.15
298.445
378.455
389.5
417.5
503.7
165.4
106
63
45.4
20
7.6
0
LENS LARGE
Ø90
*: REFER TO MODEL VL-IR 1159-1442
103
(126.5)


HEAD AND RESONATOR DIMENSION
*: REFER TO MODEL VL-IR 1209-1042
2X REFERENCE HOLES ø6H7x 8
4X FIXING HOLES M6X1
59
44
28.5
10
0
31.5
43
51
61
68.5
77
0
57
85.15
102.15
163.15
238.445
318.455
329.5
357.5
443.7
165.4
106
63
45.4
20
0
103
(126.5)


BEAM EXIT
2X REFERENCE HOLES ø6H7 8
4X FIXING HOLES M6X1
59
44
28.5 0.01
10
0
31.5
43 0.01
51
61
68.5
77
0
57
85.15 0.1
102.15
163.15
237.45
317.46
328.5
356.5
442.7
165.4
106
63
45.4
30.9
20
0
LENS SMALL
Ø47
*: REFER TO MODEL VL-IR 1209-1342
103
(126.5)


BEAM EXIT
2X REFERENCE HOLES ø6H7 8
4X FIXING HOLES M6X1
59
44 0.01
28.5
10
0
31.5
43 0.01
51
61
68.5
77
0
57
85.15 0.1
102.15
163.15
237.445
317.455
328.5
356.5
442.7
165.4
106
63
45.4
20
7.6
0
LENS LARGE
Ø90
*: REFER TO MODEL VL-IR 1209-1442
103
(126.5)

APPENDIX G: DECLARATION OF CONFORMITY

CE

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Laser Marking Business Unit
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declares that the

VLASE xxxx-xxx2 ; CLASS 4 LASER PRODUCT

and all its models

are in conformity with the requirements of the European Council Directives listed below:

2004 / 108 / EC EMC Directive
2006/95/EC Low Voltage Directive

This Declaration is based upon compliance of the products to the following standards:

EN 61000-6-2, SEPTEMBER 2005:	*ELECTROMAGNETIC COMPATIBILITY (EMC) PART 6-2: GENERIC STANDARDS – IMMUNITY FOR INDUSTRIAL ENVIRONMENTS*
EN 55011 (CLASS A, GROUP 2) , NOVEMBER 2009:	*ELECTROMAGNETIC COMPATIBILITY (EMC) INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT – RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS -LIMITS AND METHODS OF MEASUREMENT*
EN 61010-1, OCTOBER 2010:	*SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - PART 1: GENERAL REQUIREMENTS*
EN 60825-1, OCTOBER 2007:	*SAFETY OF LASER PRODUCTS – PART 1: EQUIPMENT CLASSIFICATION, REQUIREMENTS AND USER'S GUIDE*

Monte San Pietro, September 19th, 2014

Paolo Morselli
Quality Manager

Morselli Paolo

UNI EN ISO 9001 UNI EN ISO 14001

FIGURES

Figure 1: Control rack and resonator with scan head. vii
Figure 2: Example of a seal. 12
Figure 3: Control rack. Figure 4: Resonator with F-Theta scan lens 13
Figure 5: RF cable Figure 6: Resonator cable Figure 7: Optical fiber cable 13
Figure 8: Power supply cable Figure 9: Scan Head cable Figure 10: Command Box cable 13
Figure 11: Signal key Figure 12: Interlock connector Fig. 13: Interlock OUT connector 13
Figure 14: Safety Key Figure 15: USB Stick Figure 16: Cable gland 13
Figure 17: Sample Test Figure 18: User Manual Figure 19: Test Report 13
Figura 20: Working distance 14
Figure 21: handles rack. 15
Figure 22: Cable Kit lenght plus. 15
Figure 23: Resonator view. 16
Figure 24: Control rack front view. 17
Figure 25: Transport. 18
Figure 26: Positioning rack. 19
Figure 27: Vertical positioning (need additional fixing). 19
Figure 28: Fixing points on rack handels (cabinet assembly). 19
Figure 29: Resonator fixing points 20
Figure 30: Rack installation environment. 21
Figure 31: Fan installation. 22
Figure 32: Connecting Command Box connector. 23
Figure 33: Connecting I/O connector 23
Figure 34: Connecting interlock connector. 24
Figure 35: Connecting interlock OUT connector. 24
Figure 36: Removing the cover plate from the rack. 25
Figure 37: Passing the optical fiber through the cable gland. 25
Figure 38: Passing the optical fiber through the PG cable gland. 26
Figure 39: Connection of the optical fiber. 26
Figure 40: Fixing the cable gland. 27
Figure 41: Closing cover. 27
Figure 42: Disassembling the optical fiber cable gland from the resonator. 28
Figure 43: Passing the optical fiber through the cable gland. 28
Figure 44: Connecting the optical fiber to resonator. 29
Figure 45: Final closing. 29
Figure 46: RF cable connection. 30
Figure 47: Tightening the RF cable. 30
Figure 48: MDR connection side rack. 31

Figure 49: MDR connection side resonator. 31
Figure 50: Resonator cable connection side rack. 32
Figure 51: Resonator cable connection side resonator. 32
Figure 52: Resonator fan cable connection. 33
Figure 53: RS232 connection. 33
Figure 54: Power supply cable connection. 34
Figure 55: Groung connection. 34
Figure 56: USB mouse connection. 35
Figure 57: USB keyboard connection. 35
Figure 58: VGA monitor connection. 36
Figure 59: RJ45 Ethernet connection. 36
Figure 60: Power on. 38
Figure 61: Status leds display. 38
Figure 62: Enable command KEY. 39
Figure 63: Status leds display. 39
Figure 64: Enable command ENABLE. 40
Figure 65: Status leds display. 40
Figure 66: Male panel plug cod. TB4M (front view). 68
Figure 67: Female cable mount connector cod. TY4F (solder view). 68
Figure 68: Female panel socket cod. 09-9766-30-04 (front view). 69
Figure 69: Male cable mount connector cod. 09-9767-00-04 (front view). 69
Figure 70: Female panel socket cod. 09-3482-87-08 (front view). 70
Figure 71: Female panel socket cod. 09-3482-87-04 (front view). 70
Figure 72: Female panel socket SUB-D 25 (frontal view). 71
Figure 73: Male panel socket SUB-D 25 (frontal view). 73
Figure 74: Male panel socket SUB-D 9 (frontal view). 74
Figura 75: Timing control signals. 76
Figure 76: Key and Enable signal’s scheme 77
Figure 77: Timing signals 78
Figure 78: Connection examples. 79
Figure 79: Example of static marking application. 80
Figure 80: Example of Marking on Fly (MOF) application. 80
Figura 81: Temporal diagram of Software Thermalization. 82
Figure 82: Safety mode example. 84
Figure 83: Cleaning laser output. 85
Figure 84: Clean air filter procedure. 86
Figura 85: Positioning of external labels. 90
Figure 86: Positioning of external labels (resonator). 91
Figure 87: Eyeball section. 96

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